Intel® Platform Innovation Framework for EFI Status Codes Specification

Draft for Review

Version 0.92

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Revision History

Revision	Revision History	Date
0.9	First public release.	9/16/03
0.91	Added a new status code definition, EFI_CU_HP_EC_NO_MICROCODE_UPDATE, to the following topics: • Computing Unit Class: Host Processor Subclass (in Design Discussion) • Computing Unit Class: Error Code Definitions (in Code Definitions) Updated the following code definitions: • EFI_DEVICE_PATH_EXTENDED_DATA • EFI_RESOURCE_ALLOC_FAILURE_ERROR_DATA • EFI_STATUS_CODE_START_EXTENDED_DATA	9/1/04
0.92	Fixed the extended data structures that included the device path pointers and other variable length structures. These now contain the complete device path.	12/8/04

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1 Introduction

Overview

This specification defines the status code architecture that is required for an implementation of the Intel® Platform Innovation Framework for EFI (hereafter referred to as the "Framework"). Status codes enable system components to report information about their current state. This specification does the following:

- Describes the basic components of status codes
- Defines the status code classes; their subclasses; and the progress, error, and debug code operations for each
- Provides code definitions for the data structures that are common to all status codes
- Provides code definitions for the status code classes; subclasses; progress, error, and debug code enumerations; and extended error data that are architecturally required by the Intel® Platform Innovation Framework for EFI Architecture Specification

Organization of the Status Codes Specification

This specification is organized as listed below. Because status codes are just one component of a Framework-based firmware solution, there are a number of additional specifications that are referred to throughout this document:

- For references to other Framework specifications, click on the hyperlink in the page or navigate through the table of contents (TOC) in the left navigation pane to view the referenced specification.
- For references to non-Framework specifications, see References in the Interoperability and Component Specifications help system.

Organization of This Specification

Book	Description
Status Codes Overview	Provides a high-level explanation of status codes and the status code classes and subclasses that are defined in this specification.
Status Code Classes	Provides detailed explanations of the defined status code classes.
Code Definitions	Provides the code definitions for all status code classes; subclasses; extended error data structures; and progress, error, and debug code enumerations that are included in this specification.

Conventions Used in This Document

This document uses the typographic and illustrative conventions described below.

Data Structure Descriptions

Intel® processors based on 32-bit Intel® architecture (IA-32) are "little endian" machines. This distinction means that the low-order byte of a multibyte data item in memory is at the lowest address, while the high-order byte is at the highest address. Processors of the Intel® Itanium® processor family may be configured for both "little endian" and "big endian" operation. All implementations designed to conform to this specification will use "little endian" operation.

In some memory layout descriptions, certain fields are marked *reserved*. Software must initialize such fields to zero and ignore them when read. On an update operation, software must preserve any reserved field.

The data structures described in this document generally have the following format:

STRUCTURE NAME: The formal name of the data structure.

Summary: A brief description of the data structure.

Prototype: A "C-style" type declaration for the data structure.

Parameters: A brief description of each field in the data structure prototype.

Description: A description of the functionality provided by the data structure, including any limitations and caveats of which the caller should be aware.

Related Definitions: The type declarations and constants that are used only by this data structure.

Pseudo-Code Conventions

Pseudo code is presented to describe algorithms in a more concise form. None of the algorithms in this document are intended to be compiled directly. The code is presented at a level corresponding to the surrounding text.

In describing variables, a *list* is an unordered collection of homogeneous objects. A *queue* is an ordered list of homogeneous objects. Unless otherwise noted, the ordering is assumed to be First In First Out (FIFO).

Pseudo code is presented in a C-like format, using C conventions where appropriate. The coding style, particularly the indentation style, is used for readability and does not necessarily comply with an implementation of the *Extensible Firmware Interface Specification*.

Typographic Conventions

This document uses the typographic and illustrative conventions described below:

Plain text	The normal text typeface is used for the vast majority of the descriptive text in a specification.
Plain text (blue)	In the online help version of this specification, any plain text that is underlined and in blue indicates an active link to the cross-reference. Click on the word to follow the hyperlink. Note that these links are *not* active in the PDF of the specification.
Bold	In text, a **Bold** typeface identifies a processor register name. In other instances, a **Bold** typeface can be used as a running head within a paragraph.
Italic	In text, an *Italic* typeface can be used as emphasis to introduce a new term or to indicate a manual or specification name.
`BOLD Monospace`	Computer code, example code segments, and all prototype code segments use a `BOLD Monospace` typeface with a dark red color. These code listings normally appear in one or more separate paragraphs, though words or segments can also be embedded in a normal text paragraph.
`Bold Monospace`	In the online help version of this specification, words in a `Bold Monospace` typeface that is underlined and in blue indicate an active hyperlink to the code definition for that function or type definition. Click on the word to follow the hyperlink. Note that these links are *not* active in the PDF of the specification. Also, these inactive links in the PDF may instead have a `Bold Monospace` appearance that is underlined but in dark red. Again, these links are not active in the PDF of the specification.
`Italic Monospace`	In code or in text, words in *`Italic Monospace`* indicate placeholder names for variable information that must be supplied (i.e., arguments).
`Plain Monospace`	In code, words in a `Plain Monospace` typeface that is a dark red color but is not bold or italicized indicate pseudo code or example code. These code segments typically occur in one or more separate paragraphs.

See the master Framework glossary in the Framework Interoperability and Component Specifications help system for definitions of terms and abbreviations that are used in this document or that might be useful in understanding the descriptions presented in this document.

See the master Framework references in the Interoperability and Component Specifications help system for a complete list of the additional documents and specifications that are required or suggested for interpreting the information presented in this document.

The Framework Interoperability and Component Specifications help system is available at the following URL:

http://www.intel.com/technology/framework/spec.htm

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Status Codes Overview

Introduction

This section provides a basic overview of status codes and describes the following:

- Basic terms that are used throughout this specification
- The different types of status codes
- Classes of status codes that are defined in this specification
- Instance numbers for class/subclass pairings
- The sets of operations that are available for each class/subclass pair

The basic definition of a status code is contained in the **`ReportStatusCode()`** definition in the *Intel® Platform Innovation Framework for EFI Architecture Specification Driver Execution Environment Core Interface Specification* (DXE CIS).

Terms

The following terms are used throughout this document:

debug code

Data produced by various software entities that contains information specifically intended to assist in debugging. The format of the debug code data is governed by this specification.

error code

Data produced by various software entities that indicates an abnormal condition. The format of the error code data is governed by this specification.

progress code

Data produced by various software entities that indicates forward progress. The format of the progress code data is governed by this specification.

status code

Either of the three types of codes: progress code, error code, or debug code.

status code driver

The driver that produces the Status Code Architectural Protocol (**`EFI_STATUS_CODE_ARCH_PROTOCOL`**) and hooks the Runtime Service **`ReportStatusCode()`**. The status code driver can send the status code to the appropriate listeners. The mechanism by which the status code driver locates appropriate listeners is not architectural and is not described in this document. The data hub is a default listener. Status codes that are reported to the Runtime Service **`ReportStatusCode()`** are different from the **`EFI_STATUS`** returned by various functions. The term **`EFI_STATUS`** is defined in the *EFI 1.10 Specification.*

Types of Status Codes

There are three types of status codes:

- Progress codes
- Error codes
- Debug codes

Progress codes describe the activity that is currently taking place. Error codes describe exceptions to expected or desired behavior. Debug codes report information that is useful for debugging.

Status Code Classes

Status codes are organized into a high-level set of classes. These classes correspond to broad types of system hardware or software entities. Each class is subdivided into a number of subclasses. These subclasses may correspond to a variety of hardware devices comprising a class or software component types.

The Framework architecture defines three status code classes for hardware and one class for software:

- Hardware classes:
  - Computing unit
  - User-accessible peripheral
  - I/O bus
- Software class:
  - Host software

Class/subclass pairing should be able to classify any system entity, whether software or hardware. For example, the boot-strap processor (BSP) in a system would be a member of the computing unit class and host processor subclass, while a graphics processor would also be a member of the computing unit class, but a member of the I/O processor subclass.

Instance Number

Because a system may contain multiple entities matching a class/subclass pairing, there is an *instance number*. Instance numbers have different meanings for different classes. However, an instance number of 0xFFFFFFFF always indicates that instance information is unavailable, not applicable, or not provided.

Valid instance numbers start from 0. So a 4-processor server would logically have four instances of the class/subclass pairing, computing unit/host processor, instance numbers 0 to 3.

Due to the complexity of system design, it is outside of the scope of this specification how to pair instance numbers with the actual component—for instance, determining which processor is number 3. However, this specification mandates that the numbering be consistent with the other agents in the system. For example, the processor numbering scheme that is followed by status codes must be consistent with the one followed by the data hub.

Operations

For each entity classification (class/subclass pair) there are three sets of operations:

- Progress codes
- Error codes
- Debug codes

For progress codes, operations correspond to activities related to the component classification. For error codes, operations correspond to exception conditions (errors). For debug codes, operations correspond to the basic nature of the debug information.

The values 0x00–0x0FFF are common operations that are shared by all subclasses in a class. There are also subclass-specific operations/error codes. Out of the subclass-specific operations, the values 0x1000–0x7FFF are reserved by this specification. The remaining values (0x8000–0xFFFF) are not defined by this specification and OEMs can assign meaning to values in this range. The combination of class and subclass operations provides the complete set of operations that may be reported by an entity. The figure below demonstrates the hierarchy of class and subclass and progress, error, and debug operations.

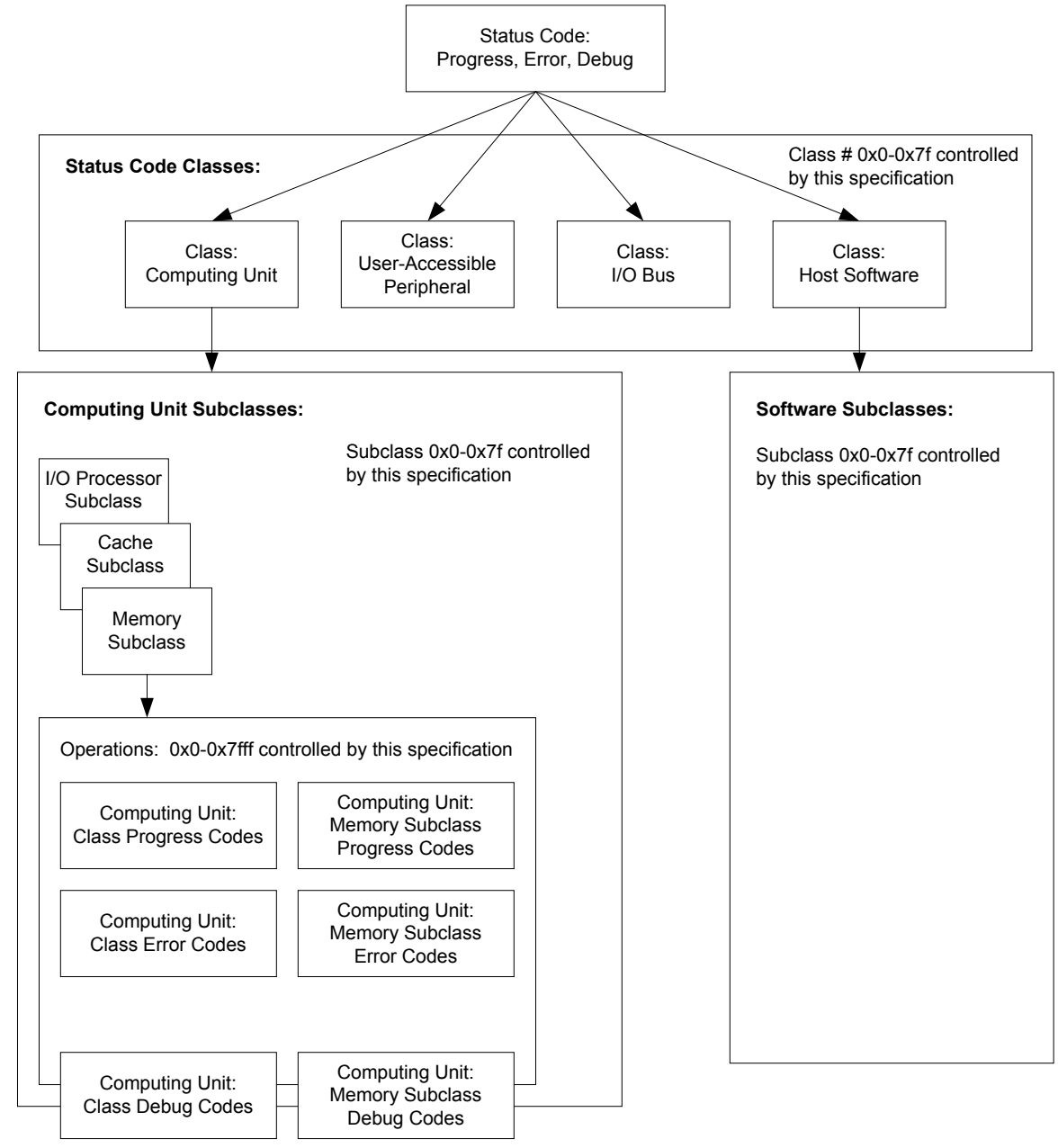

Figure 2-1. Hierarchy of Status Code Operations

The organization of status codes, progress versus error, class, subclass, and operation facilitate a flexible reporting of status codes. In the simplest case, reporting the status code might only convey that an event occurred. In a slightly more complex system, it might be possible to report the class and if it is a progress, error, or debug Code. In such a case, it is at least possible to understand that the system is executing a software activity or that an error occurred with a computing unit. If more reporting capability is present, the error could be isolated to include the subclass—for example, an error occurred related to memory, or the system is currently executing the PEI Foundation software. If yet more capability is present, information about the type of error or activity is available—for example, single-bit ECC error or PEIM dispatch in progress. If the reporting capability is complete, it can provide the detailed error information about the single-bit ECC error, including the location and a string describing the failure. A large spectrum of consumer capability can be supported with a single interface for the producers of progress and error information.

3 Status Code Classes

Status Code Classes

The Framework architecture defines four classes of status codes—three classes for hardware and one class for software. These classes are listed in the table below and described in detail in the rest of this section. Each class is made up of several subclasses, which are also defined later in this section.

See Code Definitions for all the definitions of all data types and enumerations listed in this section.

Table 3-1. Class Definitions

Type of Class	Class Name	Data Type Name
Hardware	Computing Unit	EFI_COMPUTING_UNIT
	User-Accessible Peripheral	EFI_PERIPHERAL
	I/O Bus	EFI_IO_BUS
Software	Host Software	EFI_SOFTWARE

Hardware Classes

Computing Unit Class

The Computing Unit class covers components directly related to system computational capabilities. Subclasses correspond to types of computational devices and resources. See the following for the computing unit class:

- Instance Number
- Progress Code Operations
- Error Code Operations
- Defined Subclasses

Instance Number

The instance number refers to the computing unit's geographic location in some manner. An instance number of 0xFFFFFFFF means that the instance number information is not available or the provider of the information is not interested in providing the instance number.

Progress Code Operations

All computing unit subclasses share the operation codes listed in the table below. See Progress Code Definitions in Code Definitions: Computing Unit Class for the definitions of these progress codes.

Table 3-2. Progress Code Operations: Computing Unit Class

Operation	Description	Extended Data
EFI_CU_PC_INIT_BEGIN	General computing unit initialization begins. No details regarding operation are made available.	See subclass.
EFI_CU_PC_INIT_END	General computing unit initialization ends. No details regarding operation are made available.	See subclass.
0x0002–0x0FFF	Reserved for future use by this specification for Computing Class progress codes.	NA
0x1000–0x7FFF	Reserved for subclass use. See the subclass definitions within this specification for value definitions.	NA
0x8000–0xFFFF	Reserved for OEM use.	OEM defined.

Error Code Operations

All computing unit subclasses share the error codes listed in the table below. See Error Code Definitions in Code Definitions: Computing Unit Class for the definitions of these error codes.

Table 3-3. Error Code Operations: Computing Unit Class

Operation	Description	Extended Data
EFI_CU_EC_NON_SPECIFIC	No error details available.	See subclass.
EFI_CU_EC_DISABLED	Instance is disabled.	See subclass.
EFI_CU_EC_NOT_SUPPORTED	Instance is not supported.	See subclass.
EFI_CU_EC_NOT_DETECTED	Instance not detected when it was expected to be present.	See subclass.
EFI_CU_EC_NOT_CONFIGURED	Instance could not be properly or completely initialized or configured.	See subclass.
0x0005–0x0FFF	Reserved for future use by this specification for Computing Class error codes.	NA
0x1000–0x7FFF	Subclass defined: See the subclass definitions within this specification.	NA
0x8000–0xFFFF	Reserved for OEM use.	OEM defined.

Subclasses

Defined Subclasses

The table below lists the subclasses in the Computing Unit class. The following topics describe each subclass in more detail.

See Subclass Definitions in Code Definitions: Computing Unit Class for the definitions of these subclasses.

Table 3-4. Computing Unit Class: Subclasses

Subclass	Code Name	Description
Unspecified	EFI_COMPUTING_UNIT_UNSPECIFIED	The computing unit type is unknown, undefined, or unspecified.
Host processor	EFI_COMPUTING_UNIT_HOST_ PROCESSOR	The computing unit is a full-service central processing unit.
Firmware processor	EFI_COMPUTING_UNIT_FIRMWARE_ PROCESSOR	The computing unit is a limited service processor, typically designed to handle tasks of limited scope.
I/O processor	EFI_COMPUTING_UNIT_IO_PROCESSOR	The computing unit is a processor designed specifically to handle I/O transactions.
Cache	EFI_COMPUTING_UNIT_CACHE	The computing unit is a cache. All types of cache qualify.
Memory	EFI_COMPUTING_UNIT_MEMORY	The computing unit is memory. Many types of memory qualify.
Chipset	EFI_COMPUTING_UNIT_CHIPSET	The computing unit is a chipset component.
0x07–0x7F	Reserved for future use by this specification.	
0x80–0xFF	Reserved for OEM use.	

Unspecified Subclass

This subclass can be used for any computing unit type of component that does not belong in one of the other subclasses.

See Subclass Definitions in Code Definitions: Computing Unit Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the Computing Unit class, the table below lists the additional codes for this subclass.

Table 3-5. Progress and Error Code Operations: Computing Unit Unspecified Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

Host Processor Subclass

This subclass is used for computing units that provide the system's main processing power and their associated hardware. These are general-purpose processors capable of a wide range of functionality. The instance number matches the processor handle number that is assigned to the processor by the Multiprocessor (MP) Services Protocol. They often contain multiple levels of embedded cache.

See Subclass Definitions in Code Definitions: Computing Unit Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the Computing Unit class, the table below lists the additional codes for this subclass.

See "Related Definitions" below for links to the definitions of code listed in this table.

Table 3-6. Progress and Error Code Operations: Host Processor Subclass

Type of Code	Operation	Description	Extended Data
Progress	EFI_CU_HP_PC_POWER_ON_INIT	Power-on initialization	None
	EFI_CU_HP_PC_CACHE_INIT	Embedded cache initialization including cache controller hardware and cache memory.	EFI_CACHE_INIT_DATA

continued

Table 3-6. Progress and Error Code Operations: Host Processor Subclass (continued)

Type of Code	Operation	Description	Extended Data
Progress (cont.)	EFI_CU_HP_PC_RAM_INIT	Embedded RAM initialization	None
	EFI_CU_HP_PC_MEMORY_CONTROLLER_INIT	Embedded memory controller initialization	None
	EFI_CU_HP_PC_IO_INIT	Embedded I/O complex initialization	None
	EFI_CU_HP_PC_BSP_SELECT	BSP selection	None
	EFI_CU_HP_PC_BSP_RESELECT	BSP reselection	None
	EFI_CU_HP_PC_AP_INIT	AP initialization (this operation is performed by the current BSP)	None
	EFI_CU_HP_PC_SMM_INIT	SMM initialization	None
	0x000B–0x7FFF	Reserved for future use by this specification	NA
Error	EFI_CU_EC_DISABLED	Instance is disabled. This is a standard error code for this class.	EFI_COMPUTING_UNIT_CPU_DISABLED_ERROR_DATA
	EFI_CU_HP_EC_INVALID_TYPE	Instance is not a valid type.	None
	EFI_CU_HP_EC_INVALID_SPEED	Instance is not a valid speed.	None
	EFI_CU_HP_EC_MISMATCH	Mismatch detected between two instances.	EFI_HOST_PROCESSOR_MISMATCH_ERROR_DATA
	EFI_CU_HP_EC_TIMER_EXPIRED	A watchdog timer expired.	None
	EFI_CU_HP_EC_SELF_TEST	Instance detected an error during BIST	None
	EFI_CU_HP_EC_INTERNAL	Instance detected an IERR.	None
	EFI_CU_HP_EC_THERMAL	An over temperature condition was detected with this instance.	EFI_COMPUTING_UNIT_THERMAL_ERROR_DATA

continued

Table 3-6. Progress and Error Code Operations: Host Processor Subclass (continued)

Type of Code	Operation	Description	Extended Data
Error (cont.)	EFI_CU_HP_EC_LOW_VOLTAGE	Voltage for this instance dropped below the low voltage threshold.	EFI_COMPUTING_UNIT_VOLTAGE_ERROR_DATA
	EFI_CU_HP_EC_HIGH_VOLTAGE	Voltage for this instance surpassed the high voltage threshold	EFI_COMPUTING_UNIT_VOLTAGE_ERROR_DATA
	EFI_CU_HP_EC_CACHE	The instance suffered a cache failure.	None
	EFI_CU_HP_EC_MICROCODE_UPDATE	Instance microcode update failed	EFI_COMPUTING_UNIT_MICROCODE_UPDATE_ERROR_DATA
	EFI_CU_HP_EC_CORRECTABLE	Correctable error detected	None
	EFI_CU_HP_EC_UNCORRECTABLE	Uncorrectable ECC error detected	None
	EFI_CU_HP_EC_NO_MICROCODE_UPDATE	No matching microcode update is found	None
	0x100D–0x7FFF	Reserved for future use by this specification	NA

Related Definitions

See the following topics in Code Definitions: Computing Unit Class for definitions of the subclass-specific operations listed above:

- Progress Code Definitions
- Error Code Definitions

See Extended Error Data in Code Definitions: Computing Unit Class for definitions of the extended error data listed above.

Firmware Processor Subclass

This subclass applies to processors other than the Host Processors that provides services to the system.

See Subclass Definitions in Code Definitions: Computing Unit Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the Computing Unit class, the table below lists the additional codes for this subclass.

See "Related Definitions" below for links to the definitions of code listed in this table.

Table 3-7. Progress and Error Code Operations: Service Processor Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	EFI_CU_FP_EC_HARD_FAIL	Firmware processor detected a hardware error during initialization.	None
	EFI_CU_FP_EC_SOFT_FAIL	Firmware processor detected an error during initialization. E.g. Firmware processor NVRAM contents are invalid.	None
	EFI_CU_FP_EC_COMM_ERROR	The host processor encountered an error while communicating with the firmware processor.	None
	0x1004–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

See the following topics in Code Definitions: Computing Unit Class for definitions of the subclass-specific operations listed above:

- Progress Code Definitions
- Error Code Definitions

I/O Processor Subclass

This subclass applies to system I/O processors and their associated hardware. These processors are typically designed to offload I/O tasks from the central processors in the system. Examples would include graphics or I20 processors. The subclass is identical to the host processor subclass. See Host Processor Subclass for more information.

See Subclass Definitions in Code Definitions: Computing Unit Class for the definition of this subclass.

Cache Subclass

The cache subclass applies to any external/system level caches. Any cache embedded in a computing unit would not be counted in this subclass, but would be considered a member of that computing unit subclass.

See Subclass Definitions in Code Definitions: Computing Unit Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the Computing Unit class, the table below lists the additional codes for this subclass.

See "Related Definitions" below for links to the definitions of code listed in this table.

Table 3-8. Progress and Error Code Operations: Cache Subclass

Type of Code	Operation	Description	Extended Data
Progress	EFI_CU_CACHE_PC_PRESENCE_DETECT	Detecting cache presence.	None
	EFI_CU_CACHE_PC_CONFIGURATION	Configuring cache.	None
	0x1002–0x7FFF	Reserved for future use by this specification.	NA
Error	EFI_CU_CACHE_EC_INVALID_TYPE	Instance is not a valid type.	None
	EFI_CU_CACHE_EC_INVALID_SPEED	Instance is not a valid speed.	None
	EFI_CU_CACHE_EC_INVALID_SIZE	Instance size is invalid.	None
	EFI_CU_CACHE_EC_MISMATCH	Instance does not match other caches.	None
	0x1004–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

See the following topics in Code Definitions: Computing Unit Class for definitions of the subclass-specific operations listed above:

- Progress Code Definitions
- Error Code Definitions

Memory Subclass

The memory subclass applies to any external/system level memory and associated hardware. Any memory embedded in a computing unit would not be counted in this subclass, but would be considered a member of that computing unit subclass.

See Subclass Definitions in Code Definitions: Computing Unit Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the Computing Unit class, the table below lists the additional codes for this subclass.

See "Related Definitions" below for links to the definitions of code listed in this table.

For all operations and errors, the instance number specifies the DIMM number unless stated otherwise. Some of the operations may affect multiple memory devices and multiple memory controllers. The specification provides mechanisms (**EFI_MULTIPLE_MEMORY_DEVICE_OPERATION** and others) to describe such group operations. See **EFI_STATUS_CODE_DIMM_NUMBER** in Extended Error Data: Memory Subclass (in chapter 3, "Code Definitions") for details.

Table 3-9. Progress and Error Code Operations: Memory Subclass

Type of Code	Operation	Description	Extended Data
Progress	EFI_CU_MEMORY_PC_SPD_READ	Reading configuration data (e.g. SPD) from memory devices.	None
	EFI_CU_MEMORY_PC_PRESENCE_DETECT	Detecting presence of memory devices (e.g. DIMMs).	None
	EFI_CU_MEMORY_PC_TIMING	Determining optimum configuration e.g. timing for memory devices.	None
	EFI_CU_MEMORY_PC_CONFIGURING	Initial configuration of memory device and memory controllers.	None
	EFI_CU_MEMORY_PC_OPTIMIZING	Programming the memory controller and memory devices with optimized settings.	None

continued

Table 3-9. Progress and Error Code Operations: Host Processor Subclass (continued)

Type of Code	Operation	Description	Extended Data
Progress (cont.)	EFI_CU_MEMORY_PC_INIT	Memory initialization such as ECC initialization.	EFI_MEMORY_RANGE_EXTENDED_DATA
	EFI_CU_MEMORY_PC_TEST	Performing memory test.	EFI_MEMORY_RANGE_EXTENDED_DATA
	0x1007–0x7FFF	Reserved for future use by this specification.	NA
Error	EFI_CU_MEMORY_EC_INVALID_TYPE	Instance is not a valid type.	None
	EFI_CU_MEMORY_EC_INVALID_SPEED	Instance is not a valid speed.	None
	EFI_CU_MEMORY_EC_CORRECTABLE	Correctable error detected.	EFI_MEMORY_EXTENDED_ERROR_DATA
	EFI_CU_MEMORY_EC_UNCORRECTABLE	Uncorrectable error detected. This included memory miscomparisions during the memory test.	EFI_MEMORY_EXTENDED_ERROR_DATA
	EFI_CU_MEMORY_EC_SPD_FAIL	Instance SPD failure detected.	None
	EFI_CU_MEMORY_EC_INVALID_SIZE	Instance size is invalid.	None
	EFI_CU_MEMORY_EC_MISMATCH	Mismatch detected between two instances.	EFI_MEMORY_MODULE_MISMATCH_ERROR_DATA
	EFI_CU_MEMORY_EC_S3_RESUME_FAIL	Resume from S3 failed.	None
	EFI_CU_MEMORY_EC_UPDATE_FAIL	Flash Memory Update failed.	None
	EFI_CU_MEMORY_EC_NONE_DETECTED	Memory was not detected in the system. Instance field is ignored.	None

continued

Table 3-9. Progress and Error Code Operations: Host Processor Subclass (continued)

Type of Code	Operation	Description	Extended Data
Error (cont.)	EFI_CU_MEMORY_EC_NONE_USEFUL	No useful memory was detected in the system. E.g., Memory was detected, but cannot be used due to errors. Instance field is ignored.	None
	0x1009–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

See the following topics in Code Definitions: Computing Unit Class for definitions of the subclass-specific operations listed above:

- Progress Code Definitions
- Error Code Definitions

See Extended Error Data in Code Definitions: Computing Unit Class for definitions of the extended error data listed above.

Chipset Subclass

This subclass can be used for any chipset components and their related hardware.

See Subclass Definitions in Code Definitions: Computing Unit Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the Computing Unit class, the table below lists the additional codes for this subclass.

Table 3-10. Progress and Error Code Operations: Chipset Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	

Related Definitions

None.

User-Accessible Peripheral Class

The User-Accessible Peripheral class refers to any peripheral with which the user interacts. Subclass elements correspond to general classes of peripherals. See the following for the User-Accessible Peripheral class:

- Instance Number
- Progress Code Operations
- Error Code Operations
- Defined Subclasses

Instance Number

The instance number refers to the peripheral's geographic location in some TBD manner. Instance number of 0 means that instance number information is not available or the provider of the information is not interested in providing the instance number.

Progress Code Operations

All peripheral subclasses share the operation codes listed in the table below. See Progress Code Definitions in Code Definitions: User-Accessible Peripheral Class for the definitions of these progress codes.

Table 3-11. Progress Code Operations: User-Accessible Peripheral Class

Operation	Description	Extended Data
EFI_P_PC_INIT	General Initialization. No details regarding operation are made available.	See subclass.
EFI_P_PC_RESET	Resetting the peripheral.	See subclass.
EFI_P_PC_DISABLE	Disabling the peripheral.	See subclass.
EFI_P_PC_PRESENCE_DETECT	Detecting the presence.	See subclass.
EFI_P_PC_ENABLE	Enabling the peripheral.	See subclass.
EFI_P_PC_RECONFIG	Reconfiguration.	See subclass.
EFI_P_PC_DETECTED	Peripheral was detected.	See subclass.
0x0006–0x0FFF	Reserved for future use by this specification for Peripheral Class progress codes.	NA
0x1000–0x7FFF	Reserved for subclass use. See the subclass definitions within this specification for value definitions.	See subclass.
0x8000–0xFFFF	Reserved for OEM use.	NA

Error Code Operations

All peripheral subclasses share the error codes listed in the table below. See Error Code Definitions in Code Definitions: User-Accessible Peripheral Class for the definitions of these error codes.

Table 3-12. Error Code Operations: User-Accessible Peripheral Class

Operation	Description	Extended Data
EFI_P_EC_NON_SPECIFIC	No error details available.	See subclass
EFI_P_EC_DISABLED	Instance is disabled.	See subclass
EFI_P_EC_NOT_SUPPORTED	Instance is not supported.	See subclass
EFI_P_EC_NOT_DETECTED	Instance not detected when it was expected to be present.	See subclass
EFI_P_EC_NOT_CONFIGURED	Instance could not be properly or completely initialized or configured.	See subclass
EFI_P_EC_INTERFACE_ERROR	An error occurred with the peripheral interface.	See subclass
EFI_P_EC_CONTROLLER_ERROR	An error occurred with the peripheral controller.	See subclass
EFI_P_EC_INPUT_ERROR	An error occurred getting input from the peripheral.	See subclass.
EFI_P_EC_OUTPUT_ERROR	An error occurred putting output to the peripheral.	See subclass.
EFI_P_EC_RESOURCE_CONFLICT	A resource conflict exists with this instance's resource requirements.	See EFI_RESOURCE_ALLOC_FAILURE_ERROR_DATA for all subclasses.
0x0006–0x0FFF	Reserved for future use by this specification for User-Accessible Peripheral class error codes.	NA
0x1000–0x7FFF	See the subclass definitions within this specification.	See subclass
0x8000–0xFFFF	Reserved for OEM use.	NA

Subclasses

Defined Subclasses

The table below lists the subclasses in the User-Accessible Peripheral class. The following topics describe each subclass in more detail.

See Subclass Definitions in Code Definitions: User-Accessible Peripheral Class for the definitions of these subclasses.

Table 3-13. Defined Subclasses: User-Accessible Peripheral Class

Subclass	Code Name	Description
Unspecified	EFI_PERIPHERAL_UNSPECIFIED	The peripheral type is unknown, undefined, or unspecified.
Keyboard	EFI_PERIPHERAL_KEYBOARD	The peripheral referred to is a keyboard.
Mouse	EFI_PERIPHERAL_MOUSE	The peripheral referred to is a mouse.
Local console	EFI_PERIPHERAL_LOCAL_CONSOLE	The peripheral referred to is a console directly attached to the system.
Remote console	EFI_PERIPHERAL_REMOTE_CONSOLE	The peripheral referred to is a console that can be remotely accessed.
Serial port	EFI_PERIPHERAL_SERIAL_PORT	The peripheral referred to is a serial port.
Parallel port	EFI_PERIPHERAL_PARALLEL_PORT	The peripheral referred to is a parallel port.
Fixed media	EFI_PERIPHERAL_FIXED_MEDIA	The peripheral referred to is a fixed media device—e.g., an IDE hard disk drive.
Removable media	EFI_PERIPHERAL_REMOVABLE_MEDIA	The peripheral referred to is a removable media device—e.g., a DVD-ROM drive.
Audio input	EFI_PERIPHERAL_AUDIO_INPUT	The peripheral referred to is an audio input device—e.g., a microphone.
Audio output	EFI_PERIPHERAL_AUDIO_OUTPUT	The peripheral referred to is an audio output device—e.g., speakers or headphones.
LCD device	EFI_PERIPHERAL_LCD_DEVICE	The peripheral referred to is an LCD device.
Network device	EFI_PERIPHERAL_NETWORK	The peripheral referred to is a network device—e.g., a network card.
0x0D–0x7F	Reserved for future use by this specification.	
0x80–0xFF	Reserved for OEM use.	

Unspecified Subclass

This subclass applies to any user-accessible peripheral not belonging to any of the other subclasses.

See Subclass Definitions in Code Definitions: User-Accessible Peripheral Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the User-Accessible Peripheral class, the table below lists the additional codes for this subclass.

Table 3-14. Progress and Error Code Operations: Peripheral Unspecified Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

Keyboard Subclass

This subclass applies to any keyboard style interfaces. *ExtendedData* contains the device path to the keyboard device as defined in **EFI_DEVICE_PATH_EXTENDED_DATA** and the instance is ignored.

See Subclass Definitions in Code Definitions: User-Accessible Peripheral Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the User-Accessible Peripheral class, the table below lists the additional codes for this subclass.

See "Related Definitions" below for links to the definitions of code listed in this table.

Table 3-15. Progress and Error Code Operations: Keyboard Subclass

Type of Code	Operation	Description	Extended Data
Progress	EFI_P_KEYBOARD_PC_CLEAR_BUFFER	Clearing the input keys from keyboard.	The device path to the keyboard device. See EFI_DEVICE_PATH_EXTENDED_DATA
	EFI_P_KEYBOARD_PC_SELF_TEST	Keyboard self-test.	The device path to the keyboard device. See EFI_DEVICE_PATH_EXTENDED_DATA.
	0x1002–0x7FFF	Reserved for future use by this specification.	NA
Error	EFI_P_KEYBOARD_EC_LOCKED	The keyboard input is locked.	The device path to the keyboard device. See EFI_DEVICE_PATH_EXTENDED_DATA
	EFI_P_KEYBOARD_EC_STUCK_KEY	A stuck key was detected.	The device path to the keyboard device. See EFI_DEVICE_PATH_EXTENDED_DATA
	0x1002–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

See the following topics in Code Definitions: User-Accessible Peripheral Class for definitions of the subclass-specific operations listed above:

- Progress Code Definitions
- Error Code Definitions

See Extended Error Data in Code Definitions: User-Accessible Peripheral Class for definitions of the extended error data listed above.

Mouse Subclass

This subclass applies to any mouse or pointer peripherals. *ExtendedData* contains the device path to the mouse device as defined in **EFI_DEVICE_PATH_EXTENDED_DATA** and the instance is ignored.

See Subclass Definitions in Code Definitions: User-Accessible Peripheral Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the User-Accessible Peripheral class, the table below lists the additional codes for this subclass.

See "Related Definitions" below for links to the definitions of code listed in this table.

Table 3-16. Progress and Error Code Operations: Mouse Subclass

Type of Code	Operation	Description	Extended Data
Progress	EFI_P_MOUSE_PC_SELF_TEST	Mouse self-test.	The device path to the mouse device. See EFI_DEVICE_PATH_EXTENDED_DATA.
	0x1001–0x7FFF	Reserved for future use by this specification.	NA
Error	EFI_P_MOUSE_EC_LOCKED	The mouse input is locked.	The device path to the mouse device. See EFI_DEVICE_PATH_EXTENDED_DATA
	0x1001–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

See the following topics in Code Definitions: User-Accessible Peripheral Class for definitions of the subclass-specific operations listed above:

- Progress Code Definitions
- Error Code Definitions

See Extended Error Data in Code Definitions: User-Accessible Peripheral Class for definitions of the extended error data listed above.

Local Console Subclass

This subclass applies to all console devices directly connected to the system. This would include VGA/UGA devices. *ExtendedData* contains the device path to the console device as defined in **EFI_DEVICE_PATH_EXTENDED_DATA** and the instance is ignored. LCD devices have their own subclass.

See Subclass Definitions in Code Definitions: User-Accessible Peripheral Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the User-Accessible Peripheral class, the table below lists the additional codes for this subclass.

Table 3-17. Progress and Error Code Operations: Local Console Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

Remote Console Subclass

This subclass applies to any console not directly connected to the system. This would include consoles displayed via serial or LAN connections. *ExtendedData* contains the device path to the console device as defined in **EFI_DEVICE_PATH_EXTENDED_DATA** and the instance is ignored.

See Subclass Definitions in Code Definitions: User-Accessible Peripheral Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the User-Accessible Peripheral class, the table below lists the additional codes for this subclass.

Table 3-18. Progress and Error Code Operations: Remote Console Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

Serial Port Subclass

This subclass applies to devices attached to a system serial port, such as a modem. *ExtendedData* contains the device path to the device as defined in **EFI_DEVICE_PATH_EXTENDED_DATA** and the instance is ignored.

See Subclass Definitions in Code Definitions: User-Accessible Peripheral Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the User-Accessible Peripheral class, the table below lists the additional codes for this subclass.

See "Related Definitions" below for links to the definitions of code listed in this table.

Table 3-19. Progress and Error Code Operations: Serial Port Subclass

Type of Code	Operation	Description	Extended Data
Progress	EFI_P_SERIAL_PORT_PC_CLEAR_BUFFER	Clearing the serial port input buffer.	The device handle. See EFI_DEVICE_PATH_EXTENDED_DATA.
	0x1001–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

See the following topics in Code Definitions: User-Accessible Peripheral Class for definitions of the subclass-specific operations listed above:

- Progress Code Definitions
- Error Code Definitions

See Extended Error Data in Code Definitions: User-Accessible Peripheral Class for definitions of the extended error data listed above.

Parallel Port Subclass

This subclass applies to devices attached to a system parallel port, such as a printer. *ExtendedData* contains the device path to the device as defined in **EFI_DEVICE_PATH_EXTENDED_DATA** and the instance is ignored.

See Subclass Definitions in Code Definitions: User-Accessible Peripheral Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the User-Accessible Peripheral class, the table below lists the additional codes for this subclass.

Table 3-20. Progress and Error Code Operations: Parallel Port Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

Fixed Media Subclass

This subclass applies to fixed media peripherals such as hard drives. These peripherals are capable of producing the **EFI_BLOCK_IO** Protocol. *ExtendedData* contains the device path to the device as defined in **EFI_DEVICE_PATH_EXTENDED_DATA** and the instance is ignored.

See Subclass Definitions in Code Definitions: User-Accessible Peripheral Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the User-Accessible Peripheral class, the table below lists the additional codes for this subclass.

Table 3-21. Progress and Error Code Operations: Fixed Media Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

Removable Media Subclass

This subclass applies to removable media peripherals such as floppy disk drives or LS-120 drives. These peripherals are capable of producing the **EFI_BLOCK_IO** Protocol. *ExtendedData* contains the device path to the device as defined in **EFI_DEVICE_PATH_EXTENDED_DATA** and the instance is ignored.

See Subclass Definitions in Code Definitions: User-Accessible Peripheral Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the User-Accessible Peripheral class, the table below lists the additional codes for this subclass.

Table 3-22. Progress and Error Code Operations: Removable Media Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

Audio Input Subclass

This subclass applies to audio input devices such as microphones.

See Subclass Definitions in Code Definitions: User-Accessible Peripheral Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the User-Accessible Peripheral class, the table below lists the additional codes for this subclass.

Table 3-23. Progress and Error Code Operations: Audio Input Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

Audio Output Subclass

This subclass applies to audio output devices like speakers or headphones.

See Subclass Definitions in Code Definitions: User-Accessible Peripheral Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the User-Accessible Peripheral class, the table below lists the additional codes for this subclass.

Table 3-24. Progress and Error Code Operations: Audio Output Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

LCD Device Subclass

This subclass applies to LCD display devices attached to the system.

See Subclass Definitions in Code Definitions: User-Accessible Peripheral Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the User-Accessible Peripheral class, the table below lists the additional codes for this subclass.

Table 3-25. Progress and Error Code Operations: LCD Device Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

Network Device Subclass

This subclass applies to network adapters attached to the system. These devices are capable of producing standard EFI networking protocols such as the **EFI_SIMPLE_NETWORK** Protocol.

See Subclass Definitions in Code Definitions: User-Accessible Peripheral Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the User-Accessible Peripheral class, the table below lists the additional codes for this subclass.

Table 3-26. Progress and Error Code Operations: Network Device Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

I/O Bus Class

The I/O bus class covers hardware buses irrespective of any software protocols that are used. At a broad level, everything that connects the computing unit to the user peripheral can be covered by this class. Subclass elements correspond to industry-standard hardware buses. See the following for the I/O Bus class:

- Instance Number
- Progress Code Operations
- Error Code Operations
- Defined Subclasses

Instance Number

The instance number is ignored and the *ExtendedData* describes the device path to the controller or the device as defined in **EFI_DEVICE_PATH_EXTENDED_DATA**.

Progress Code Operations

All I/O bus subclasses share the operation codes listed in the table below. See Progress Code Definitions in Code Definitions: I/O Bus Class for the definitions of these progress codes.

Table 3-27. Progress Code Operations: I/O Bus Class

Operation	Description	Extended Data
EFI_IOB_PC_INIT	General initialization. No details regarding operation are made available.	The device path corresponding to the host bus controller (the controller that produces this bus). For the PCI bus, it is the PCI root bridge. The format of the device path extended data is defined in EFI_DEVICE_PATH_EXTENDED_DATA.
EFI_IOB_PC_RESET	Resetting the bus. Generally, this operation resets all the devices on the bus as well.	The device path corresponding to the host controller (the controller that produces this bus). The format is defined in EFI_DEVICE_PATH_EXTENDED_DATA.
EFI_IOB_PC_DISABLE	Disabling all the devices on the bus prior to enumeration.	The device path corresponding to the host controller (the controller that produces this bus). The format is defined in EFI_DEVICE_PATH_EXTENDED_DATA.
EFI_IOB_PC_DETECT	Detecting devices on the bus.	The device path corresponding to the host controller (the controller that produces this bus). The format is defined in EFI_DEVICE_PATH_EXTENDED_DATA.
EFI_IOB_PC_ENABLE	Configuring the bus and enabling device on the bus.	The device path corresponding to the host controller (the controller that produces this bus). The format is defined in EFI_DEVICE_PATH_EXTENDED_DATA.
EFI_IOB_PC_RECONFIG	Bus reconfiguration including resource re-enumeration.	The device path corresponding to the host controller (the controller that produces this bus). The format is defined in EFI_DEVICE_PATH_EXTENDED_DATA.
EFI_IOB_PC_HOTPLUG	A hot-plug event was detected on the bus and the hot-plugged device was initialized.	The device path corresponding to the host controller (the controller that produces this bus). The format is defined in EFI_DEVICE_PATH_EXTENDED_DATA.
0x0007–0x0FFF	Reserved for future use by this specification for I/O Bus class progress codes.	NA
0x1000–0x7FFF	Reserved for subclass use. See the subclass definitions within this specification for value definitions.	NA
0x8000–0xFFFF	Reserved for OEM use.	OEM defined.

Error Code Operations

All I/O bus subclasses share the error codes listed in the table below. See Error Code Definitions in Code Definitions: I/O Bus Class for the definitions of these error codes.

Table 3-28. Error Code Operations: I/O Bus Class

Operation	Description	Extended Data
EFI_IOB_EC_NON_SPECIFIC	No error details available	None.
EFI_IOB_EC_DISABLED	A device is disabled due to bus-level errors.	The device path corresponding to the device. See EFI_DEVICE_PATH_EXTENDED_DATA.
EFI_IOB_EC_NOT_SUPPORTED	A device is not supported on this bus.	The device path corresponding to the device. See EFI_DEVICE_PATH_EXTENDED_DATA.
EFI_IOB_EC_NOT_DETECTED	Instance not detected when it was expected to be present.	The device path corresponding to the device. See EFI_DEVICE_PATH_EXTENDED_DATA.
EFI_IOB_EC_NOT_CONFIGURED	Instance could not be properly or completely initialized/configured.	The device path corresponding to the device. See EFI_DEVICE_PATH_EXTENDED_DATA.
EFI_IOB_EC_INTERFACE_ERROR	An error occurred with the bus interface.	The device path corresponding to the failing device. See EFI_DEVICE_PATH_EXTENDED_DATA.
EFI_IOB_EC_CONTROLLER_ERROR	An error occurred with the host bus controller (the controller that produces this bus).	The device path corresponding to the bus controller. See EFI_DEVICE_PATH_EXTENDED_DATA.
EFI_IOB_EC_READ_ERROR	A bus specific error occurred getting input from a device on the bus.	The device path corresponding to the failing device or the closest device path. See EFI_DEVICE_PATH_
EFI_IOB_EC_WRITE_ERROR	An error occurred putting output to the bus.	The device path corresponding to the failing device or the closest device path. See EFI_DEVICE_PATH_EXTENDED_DATA.

continued

Table 3-28. Error Code Operations: I/O Bus Class (continued)

Operation	Description	Extended Data
EFI_IOB_EC_RESOURCE_CONFLICT	A resource conflict exists with this instance's resource requirements.	See EFI_RESOURCE_ALLOC_FAILURE_ERROR_DATA.
0x000A–0x0FFF	Reserved for future use by this specification for I/O Bus class error codes.	NA
0x1000–0x7FFF	See the subclass definitions within this specification.	NA
0x8000–0xFFFF	Reserved for OEM use.	NA

Subclasses

Defined Subclasses

The table below lists the subclasses in the I/O Bus class. The following topics describe each subclass in more detail.

See Subclass Definitions in Code Definitions: I/O Bus Class for the definitions of these subclasses.

Table 3-29. Defined Subclasses: I/O Bus Class

Subclass	Code Name	Description
Unspecified	EFI_IO_BUS_UNSPECIFIED	The bus type is unknown, undefined, or unspecified.
PCI	EFI_IO_BUS_PCI	The bus is a PCI bus.
USB	EFI_IO_BUS_USB	The bus is a USB bus.
InfiniBand* architecture	EFI_IO_BUS_IBA	The bus is an IBA bus.
AGP	EFI_IO_BUS_AGP	The bus is an AGP bus.
PC card	EFI_IO_BUS_PC_CARD	The bus is a PC Card bus.
Low pin count (LPC)	EFI_IO_BUS_LPC	The bus is a LPC bus.
SCSI	EFI_IO_BUS_SCSI	The bus is a SCSI bus.
ATA/ATAPI/SATA	EFI_IO_BUS_ATA_ATAPI	The bus is a ATA/ATAPI bus.
Fibre Channel	EFI_IO_BUS_FC	The bus is an EC bus.
IP network	EFI_IO_BUS_IP_NETWORK	The bus is an IP network bus.
SMBus	EFI_IO_BUS_SMBUS	The bus is a SMBUS bus.
I2C	EFI_IO_BUS_I2C	The bus is an I2C bus.
0x0D–0x7F	Reserved for future use by this specification.	
0x80–0xFF	Reserved for OEM use.	

Unspecified Subclass

This subclass applies to any I/O bus not belonging to any of the other I/O bus subclasses.

See Subclass Definitions in Code Definitions: I/O Bus Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the I/O Bus class, the table below lists the additional codes for this subclass.

Table 3-30. Progress and Error Code Operations: I/O Bus Unspecified Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

PCI Subclass

This subclass applies to PCI buses and devices. It also includes different variations of PCI bus including PCI-X and PCI Express.

See Subclass Definitions in Code Definitions: I/O Bus Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the I/O Bus class, the table below lists the additional codes for this subclass.

See "Related Definitions" below for links to the definitions of code listed in this table.

Table 3-31. Progress and Error Code Operations: PCI Subclass

Type of Code	Operation	Description	Extended Data
Progress	EFI_IOB_PCI_BUS_ENUM	Enumerating buses under a root bridge.	The device path corresponding to the PCI root bridge. See EFI_DEVICE_PATH_EXTENDED_DATA.
	EFI_IOB_PCI_RES_ALLOC	Allocating resources to devices under a host bridge.	The host bridge handle as defined in EFI_DEVICE_HANDLE_EXTENDED_DATA.
	EFI_IOB_PCI_HPC_INIT	Initializing a PCI hot-plug controller.	The device path to the controller as defined in EFI_DEVICE_PATH_EXTENDED_DATA.
	0x1003–0x7FFF	Reserved for future use by this specification.	NA

continued

Table 3-31. Progress and Error Code Operations: PCI Subclass (continued)

Type of Code	Operation	Description	Extended Data
Error	EFI_IOB_PCI_EC_PERR	Parity error; see PCI Specification.	The device path to the controller that generated the PERR. The data format is defined in EFI_DEVICE_PATH_EXTENDED_DATA.
	EFI_IOB_PCI_EC_SERR	System error; see PCI Specification.	The device path to the controller that generated the SERR. The data format is defined in EFI_DEVICE_PATH_EXTENDED_DATA.
	0x1002–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

See the following topics in Code Definitions: I/O Bus Class for definitions of the subclass-specific operations listed above:

- Progress Code Definitions
- Error Code Definitions

See Extended Error Data in Code Definitions: I/O Bus Class for definitions of the extended error data listed above.

USB Subclass

This subclass applies to USB buses and devices.

See Subclass Definitions in Code Definitions: I/O Bus Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the I/O Bus class, the table below lists the additional codes for this subclass.

Table 3-32. Progress and Error Code Operations: USB Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

InfiniBand* Architecture Subclass

This subclass applies to InfiniBand* (IBA) buses and devices.

See Subclass Definitions in Code Definitions: I/O Bus Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the I/O Bus class, the table below lists the additional codes for this subclass.

Table 3-33. Progress and Error Code Operations: IBA Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

AGP Subclass

This subclass applies to AGP buses and devices.

See Subclass Definitions in Code Definitions: I/O Bus Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the I/O Bus class, the table below lists the additional codes for this subclass.

Table 3-34. Progress and Error Code Operations: AGP Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

PC Card Subclass

This subclass applies to PC Card buses and devices.

See Subclass Definitions in Code Definitions: I/O Bus Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the I/O Bus class, the table below lists the additional codes for this subclass.

Table 3-35. Progress and Error Code Operations: PC Card Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

LPC Subclass

This subclass applies to LPC buses and devices.

See Subclass Definitions in Code Definitions: I/O Bus Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the I/O Bus class, the table below lists the additional codes for this subclass.

Table 3-36. Progress and Error Code Operations: LPC Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

SCSI Subclass

This subclass applies to SCSI buses and devices.

See Subclass Definitions in Code Definitions: I/O Bus Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the I/O Bus class, the table below lists the additional codes for this subclass.

Table 3-37. Progress and Error Code Operations: SCSI Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

ATA/ATAPI/SATA Subclass

This subclass applies to ATA and ATAPI buses and devices. It also includes Serial ATA (SATA) buses.

See Subclass Definitions in Code Definitions: I/O Bus Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the I/O Bus class, the table below lists the additional codes for this subclass.

Table 3-38. Progress and Error Code Operations: ATA/ATAPI/SATA Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

Fibre Channel (FC) Subclass

This subclass applies to Fibre Channel buses and devices.

See Subclass Definitions in Code Definitions: I/O Bus Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the I/O Bus class, the table below lists the additional codes for this subclass.

Table 3-39. Progress and Error Code Operations: FC Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

IP Network Subclass

This subclass applies to IP network buses and devices.

See Subclass Definitions in Code Definitions: I/O Bus Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the I/O Bus class, the table below lists the additional codes for this subclass.

Table 3-40. Progress and Error Code Operations: IP Network Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

SMBus Subclass

This subclass applies to SMBus buses and devices.

See Subclass Definitions in Code Definitions: I/O Bus Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the I/O Bus class, the table below lists the additional codes for this subclass.

Table 3-41. Progress and Error Code Operations: SMBus Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

I2C Subclass

This subclass applies to I2C buses and devices.

See Subclass Definitions in Code Definitions: I/O Bus Class for the definition of this subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the I/O Bus class, the table below lists the additional codes for this subclass.

Table 3-42. Progress and Error Code Operations: I2C Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

Software Classes

Host Software Class

The Host Software class covers any software-generated codes. Subclass elements correspond to common software types in an EFI system. See the following for the Host Software class:

- Instance Number
- Progress Code Operations
- Error Code Operations
- Defined Subclasses

Instance Number

The instance number is not used for software subclasses unless otherwise stated.

Progress Code Operations

All host software subclasses share the operation codes listed in the table below. See Progress Code Definitions in Code Definitions: Host Software Class for the definitions of these progress codes.

Table 3-43. Progress Code Operations: Host Software Class

Operation	Description	Extended Data
EFI_SW_PC_INIT	General initialization. No details regarding operation are made available.	None.
EFI_SW_PC_LOAD	Loading a software module in the preboot phase by using `LoadImage()` or an equivalent PEI service. May include a PEIM, DXE drivers, EFI application, etc.	Handle identifying the module. There will be an instance of `EFI_LOADED_IMAGE_PROTOCOL` on this handle. See EFI_DEVICE_HANDLE_EXTENDED_DATA.
EFI_SW_PC_INIT_BEGIN	Initializing software module by using `StartImage()` or an equivalent PEI service.	Handle identifying the module. There will be an instance of `EFI_LOADED_IMAGE_PROTOCOL` on this handle. See EFI_DEVICE_HANDLE_EXTENDED_DATA.
EFI_SW_PC_INIT_END	Software module returned control back after initialization.	Handle identifying the module. There will be an instance of `EFI_LOADED_IMAGE_PROTOCOL` on this handle. See EFI_DEVICE_HANDLE_EXTENDED_DATA.
EFI_SW_PC_AUTHENTICATE_BEGIN	Performing authentication (passwords, biometrics, etc.).	None.
EFI_SW_PC_AUTHENTICATE_END	Authentication completed.	None.
EFI_SW_PC_INPUT_WAIT	Waiting for user input.	None.
EFI_SW_PC_USER_SETUP	Executing user setup.	None.
0x0008–0x0FFF	Reserved for future use by this specification for Host Software class progress codes.	NA
0x1000–0x7FFF	Reserved for subclass use. See the subclass definitions within this specification for value definitions.	NA
0x8000–0xFFFF	Reserved for OEM use.	NA

Error Code Operations

All host software subclasses share the error codes listed in the table below. See Error Code Definitions in Code Definitions: Host Software Class for the definitions of these progress codes.

Table 3-44. Error Code Operations: Host Software Class

Operation	Description	Extended Data
EFI_SW_EC_NON_SPECIFIC	No error details are available.	None
EFI_SW_EC_LOAD_ERROR	The software module load failed.	Handle identifying the module. There will be an instance of `EFI_LOADED_IMAGE_PROTOCOL` on this handle. See EFI_DEVICE_HANDLE_EXTENDED_DATA.
EFI_SW_EC_INVALID_PARAMETER	An invalid parameter was passed to the instance.	None.
EFI_SW_EC_UNSUPPORTED	An unsupported operation was requested.	None.
EFI_SW_EC_INVALID_BUFFER	The instance encountered an invalid buffer (too large, small, or nonexistent).	None.
EFI_SW_EC_OUT_OF_RESOURCES	Insufficient resources exist.	None.
EFI_SW_EC_ABORTED	The instance was aborted.	None.
EFI_SW_EC_ILLEGAL_SOFTWARE_STATE	The instance detected an illegal software state.	See EFI_DEBUG_ASSERT_DATA
EFI_SW_EC_ILLEGAL_HARDWARE_STATE	The instance detected an illegal hardware state.	None.
EFI_SW_EC_START_ERROR	The software module returned an error when started via `StartImage()` or equivalent.	Handle identifying the module. There will be an instance of `EFI_LOADED_IMAGE_PROTOCOL` on this handle. See EFI_DEVICE_HANDLE_EXTENDED_DATA.
EFI_SW_EC_BAD_DATE_TIME	The system date/time is invalid	None.
EFI_SW_EC_CFG_INVALID	Invalid configuration settings were detected.	None.
EFI_SW_EC_CFG_CLR_REQUEST	User requested that configuration defaults be loaded (via a physical jumper, for example).	None.
EFI_SW_EC_CFG_DEFAULT	Configuration defaults were loaded.	None.
EFI_SW_EC_PWD_INVALID	Invalid password settings were detected.	None.

continued

Table 3-44. Error Code Operations: Host Software Class (continued)

Operation	Description	Extended Data
EFI_SW_EC_PWD_CLR_ REQUEST	User requested that the passwords be cleared (via a physical jumper, for example).	None.
EFI_SW_EC_PWD_CLEARED	Passwords were cleared.	None.
EFI_SW_EC_EVENT_LOG_ FULL	System event log is full.	None.
0x0012–0x00FF	Reserved for future use by this specification for Host Software class error codes.	None.
0x0100–0x01FF	Unexpected EBC exceptions.	See EFI_STATUS_CODE_EXCEP_ EXTENDED_DATA.
0x0200–0x02FF	Unexpected IA-32 processor exceptions.	See EFI_STATUS_CODE_EXCEP_ EXTENDED_DATA.
0x0300–0x03FF	Unexpected Itanium® processor family exceptions.	See EFI_STATUS_CODE_EXCEP_ EXTENDED_DATA.
0x0400–0x7FFF	See the subclass definitions within this specification.	
0x8000–0xFFFF	Reserved for OEM use.	

Subclasses

Defined Subclasses

The table below lists the subclasses in the Host Software class. The following topics describe each subclass in more detail.

See Subclass Definitions in Code Definitions: Host Software Class for the definitions of these subclasses.

Table 3-45. Defined Subclasses: Host Software Class

Subclass	Code Name	Description
Unspecified	EFI_SOFTWARE_UNSPECIFIED	The software type is unknown, undefined, or unspecified.
Security (SEC)	EFI_SOFTWARE_SEC	The software is a part of the SEC phase.
PEI Foundation	EFI_SOFTWARE_PEI_CORE	The software is the PEI Foundation module.
PEI module	EFI_SOFTWARE_PEI_MODULE	The software is a PEIM.
DXE Foundation	EFI_SOFTWARE_DXE_CORE	The software is the DXE Foundation module.

continued

Table 3-45. Defined Subclasses: Host Software Class (continued)

Subclass	Code Name	Description
DXE Boot Service driver	EFI_SOFTWARE_DXE_BS_DRIVER	The software is a DXE Boot Service driver. Boot service drivers are not available once **`ExitBootServices()`** is called.
DXE Runtime Service driver	EFI_SOFTWARE_DXE_RT_DRIVER	The software is a DXE Runtime Service driver. These drivers execute during runtime phase.
SMM driver	EFI_SOFTWARE_SMM_DRIVER	The software is a SMM driver.
EFI application	EFI_SOFTWARE_EFI_APPLICATION	The software is an EFI application.
OS loader	EFI_SOFTWARE_EFI_OS_LOADER	The software is an OS loader.
Runtime (RT)	EFI_SOFTWARE_EFI_RT	The software is a part of the RT phase.
Afterlife (AL)	EFI_SOFTWARE_EFI_AL	The software is a part of the AL phase.
EBC exception	EFI_SOFTWARE_EBC_EXCEPTION	The status code is directly related to an EBC exception.
IA-32 exception	EFI_SOFTWARE_IA32_EXCEPTION	The status code is directly related to an IA-32 exception.
Itanium® processor family exception	EFI_SOFTWARE_IPF_EXCEPTION	The status code is directly related to an Itanium processor family exception.
PEI Services	EFI_SOFTWARE_PEI_SERVICE	The status code is directly related to a PEI Services function.
EFI Boot Services	EFI_SOFTWARE_EFI_BOOT_SERVICE	The status code is directly related to an EFI Boot Services function.
EFI Runtime Services	EFI_SOFTWARE_EFI_RUNTIME_SERVICE	The status code is directly related to an EFI Runtime Services function.
DXE Services	EFI_SOFTWARE_EFI_DXE_SERVICE	The status code is directly related to a DXE Services function.
0x13–0x7F	Reserved for future use by this specification.	NA
0x80–0xFF	Reserved for OEM use.	NA

Unspecified Subclass

This subclass applies to any software entity not belonging to any of the other software subclasses. It may also be used if the caller is unable to determine the exact subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the Host Software class, the table below lists the additional codes for this subclass.

Table 3-46. Progress and Error Code Operations: Host Software Unspecified Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

SEC Subclass

This subclass applies to the Security (SEC) phase in software. The current scope of SEC software is TBD.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the Host Software class, the table below lists the additional codes for this subclass. In most platforms, status code services may be unavailable during the SEC phase.

See "Related Definitions" below for links to the definitions of code listed in this table.

Table 3-47. Progress and Error Code Operations: SEC Subclass

Type of Code	Operation	Description	Extended Data
Progress	EFI_SW_SEC_PC_ENTRY_POINT	Entry point of the phase.	None
	EFI_SW_SEC_PC_HANDOFF_TO_NEXT	Handing off to the next phase	None
	0x1002–0x7FFF	Reserved for future use by this specification.	Reserved for future use by this specification.
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

See the following topic in Code Definitions: Host Software Class for definitions of the subclass-specific operations listed above:

- Progress Code Definitions

PEI Foundation Subclass

This subclass applies to the PEI Foundation. The PEI Foundation is responsible for starting and ending the PEI phase as well as dispatching Pre-EFI Initialization Modules (PEIMs).

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the Host Software class, the table below lists the additional codes for this subclass.

See "Related Definitions" below for links to the definitions of code listed in this table.

Table 3-48. Progress and Error Code Operations: PEI Foundation Subclass

Type of Code	Operation	Description	Extended Data
Progress	EFI_SW_PEI_CORE_PC_ENTRY_POINT	Entry point of the phase.	None
	EFI_SW_PEI_CORE_PC_HANDOFF_TO_NEXT	Handing off to the next phase (DXE).	None
	EFI_SW_PEI_CORE_PC_RETURN_TO_LAST	Returning to the last phase.	None
	0x1003–0x7FFF	Reserved for future use by this specification.	NA
Error	EFI_SW_PEI_CORE_EC_DXE_CORRUPT	Unable to hand off to DXE because the DXE Foundation could not be found.	NULL
	0x1001–0x7FFF	Reserved for future use by this specification.	NULL

Related Definitions

See the following topic in Code Definitions: Host Software Class for definitions of the subclass-specific operations listed above:

- Progress Code Definitions
- Error Code Definitions

PEI Module Subclass

This subclass applies to Pre-EFI Initialization Modules (PEIMs).

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the Host Software class, the table below lists the additional codes for this subclass.

See "Related Definitions" below for links to the definitions of code listed in this table.

Table 3-49. Progress and Error Code Operations: PEI Module Subclass

Type of Code	Operation	Description	Extended Data
Progress	EFI_SW_PEI_PC_RECOVERY_BEGIN	Crisis recovery has been initiated.	NULL
	EFI_SW_PEI_PC_CAPSULE_LOAD	Found a recovery capsule. About to load the recovery capsule.	NULL
	EFI_SW_PEI_PC_CAPSULE_START	Loaded the recovery capsule. About to hand off control to the capsule.	NULL
	EFI_SW_PEI_PC_RECOVERY_USER	Recovery was forced by the user via a jumper, for example. Reported by the PEIM that detects the jumpers and updates the boot mode.	NULL
	EFI_SW_PEI_PC_RECOVERY_AUTO	Recovery was forced by the software based on some policy. Reported by the PEIM that updates the boot mode to force recovery.	NULL
	0x1002–0x7FFF	Reserved for future use by this specification.	NULL
Error	EFI_SW_PEI_EC_NO_RECOVERY_CAPSULE	Unable to continue with the crisis recovery because no recovery capsule was found.	NULL
	EFI_SW_PEIM_EC_INVALID_CAPSULE_DESCRIPTOR	An invalid or corrupt capsule descriptor was detected.	NULL
	0x1001–0x7FFF	Reserved for future use by this specification.	

Related Definitions

See the following topic in Code Definitions: Host Software Class for definitions of the subclass-specific operations listed above:

- Progress Code Definitions
- Error Code Definitions

DXE Foundation Subclass

This subclass applies to DXE Foundation software. The DXE Foundation is responsible for providing core services, dispatching DXE drivers, and calling the Boot Device Selection (BDS) phase.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the Host Software class, the table below lists the additional codes for this subclass.

See "Related Definitions" below for links to the definitions of code listed in this table.

Table 3-50. Progress and Error Code Operations: DXE Foundation Subclass

Type of Code	Operation	Description	Extended Data
Progress	EFI_SW_DXE_CORE_PC_ENTRY_POINT	Entry point of the phase.	None
	EFI_SW_DXE_CORE_PC_HANDOFF _TO_NEXT	Handing off to the next phase (Runtime).	None
	EFI_SW_DXE_CORE_PC_RETURN_ TO_LAST	Returning to the last phase.	None
	EFI_SW_DXE_CORE_PC_START_DRIVER	Calling the `Start()` function of the `EFI_DRIVER_BINDING` Protocol.	See EFI_STATUS_ CODE_START_ EXTENDED_DATA
	0x1002–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

See the following topic in Code Definitions: Host Software Class for definitions of the subclass-specific operations listed above:

- Progress Code Definitions

See Extended Error Data in Code Definitions: Host Software Class for definitions of the extended error data listed above.

DXE Boot Service Driver Subclass

This subclass applies to DXE boot service drivers. If a driver provides both boot services and runtime services, it is considered a runtime service driver.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the Host Software class, the table below lists the additional codes for this subclass.

See "Related Definitions" below for links to the definitions of code listed in this table.

Table 3-51. Progress and Error Code Operations: DXE Boot Service Driver Subclass

Type of Code	Operation	Description	Extended Data
Progress	EFI_SW_DXE_BS_PC_LEGACY_OPROM_INIT	Initializing a legacy Option ROM (OpROM).	See EFI_LEGACY_OPROM_EXTENDED_DATA.
	EFI_SW_DXE_BS_PC_READY_TO_BOOT_EVENT	The **EFI_EVENT_SIGNAL_READY_TO_BOOT** event was signaled. See the DXE CIS.	None
	EFI_SW_DXE_BS_PC_LEGACY_BOOT_EVENT	The **EFI_EVENT_SIGNAL_LEGACY_BOOT** event was signaled. See the DXE CIS.	None
	EFI_SW_DXE_BS_PC_EXIT_BOOT_SERVICES_EVENT	The **EFI_EVENT_SIGNAL_EXIT_BOOT_SERVICES** event was signaled. See the DXE CIS.	None
	EFI_SW_DXE_BS_PC_VIRTUAL_ADDRESS_CHANGE_EVENT	The **EFI_EVENT_SIGNAL_VIRTUAL_ADDRESS_CHANGE** event was signaled. See the DXE CIS.	None
	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	EFI_SW_DXE_BS_EC_LEGACY_OPROM_NO_SPACE	Not enough memory available to shadow a legacy option ROM.	See EFI_LEGACY_OPROM_EXTENDED_DATA. *RomImageBase* corresponds to the ROM image in the regular memory as opposed to shadow RAM.
	0x1001–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

See the following topic in Code Definitions: Host Software Class for definitions of the subclass-specific operations listed above:

- Progress Code Definitions
- Error Code Definitions

See Extended Error Data in Code Definitions: Host Software Class for definitions of the extended error data listed above.

DXE Runtime Service Driver Subclass

This subclass applies to DXE runtime service drivers.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the Host Software class, the table below lists the additional codes for this subclass.

Table 3-52. Progress and Error Code Operations: DXE Runtime Service Driver Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

SMM Driver Subclass

This subclass applies to SMM code.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the Host Software class, the table below lists the additional codes for this subclass.

Table 3-53. Progress and Error Code Operations: SMM Driver Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

EFI Application Subclass

This subclass applies to EFI applications.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the Host Software class, the table below lists the additional codes for this subclass.

Table 3-54. Progress and Error Code Operations: EFI Application Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

OS Loader Subclass

This subclass applies to any OS loader application. Although OS loaders are EFI applications, they are very special cases and merit a separate subclass.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the Host Software class, the table below lists the additional codes for this subclass.

Table 3-55. Progress and Error Code Operations: OS Loader Subclass

Type of Code	Operation	Description	Extended Data
Progress	0x1000–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

None.

Runtime (RT) Subclass

This subclass applies to runtime software. Runtime software is made up of the EFI-aware operating system and the non-EFI software running under the operating system environment. Other firmware components, such as SAL code or ASL code, are also executing during this phase but cannot call an EFI runtime service. Hence no codes are reserved for them.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the Host Software class, the table below lists the additional codes for this subclass.

See "Related Definitions" below for links to the definitions of code listed in this table.

Table 3-56. Progress and Error Code Operations: Runtime Subclass

Type of Code	Operation	Description	Extended Data
Progress	EFI_SW_RT_PC_ENTRY_POINT	Entry point of the phase.	None
	EFI_SW_RT_PC_HANDOFF_TO_NEXT	Handing off to the next phase (Afterlife [AL]).	None
	EFI_SW_RT_PC_RETURN_TO_LAST	Returning to the last phase.	None
	0x1003–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

See the following topic in Code Definitions: Host Software Class for definitions of the subclass-specific operations listed above:

- Progress Code Definitions

Afterlife (AL) Subclass

This subclass applies to afterlife code. Afterlife code is the firmware code that executes after the operating system calls the EFI Runtime Service `ResetSystem()`.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the Host Software class, the table below lists the additional codes for this subclass.

See "Related Definitions" below for links to the definitions of code listed in this table.

Table 3-57. Progress and Error Code Operations: Afterlife (AL) Subclass

Type of Code	Operation	Description	Extended Data
Progress	EFI_SW_AL_PC_ENTRY_POINT	Entry point of the phase.	NA
	EFI_SW_AL_PC_RETURN_TO_LAST	Returning to the last phase.	None
	0x1002–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

See the following topic in Code Definitions: Host Software Class for definitions of the subclass-specific operations listed above:

- Progress Code Definitions

PEI Services Subclass

This subclass applies to any PEI Service present in the PEI Services Table.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the Host Software class, the table below lists the additional codes for this subclass. These progress codes are reported by the code that provides the specified boot service and not by the module that invokes the given boot service.

See "Related Definitions" below for links to the definitions of code listed in this table.

Table 3-58. Progress and Error Code Operations: PEI Subclass

Type of Code	Operation	Description	Extended Data
Progress	EFI_SW_PS_PC_INSTALL_PPI	Install a PPI. See the PEI CIS.	None.
	EFI_SW_PS_PC_REINSTALL_PPI	Reinstall a PPI. See the PEI CIS.	None.
	EFI_SW_PS_PC_LOCATE_PPI	Locate an existing PPI. See the PEI CIS.	None.
	EFI_SW_PS_PC_NOTIFY_PPI	Install a notification callback. See the PEI CIS.	None.
	EFI_SW_PS_PC_GET_BOOT_MODE	Get the current boot mode. See the PEI CIS.	None.
	EFI_SW_PS_PC_SET_BOOT_MODE	Set the current boot mode. See the PEI CIS.	None.
	EFI_SW_PS_PC_GET_HOB_LIST	Get the HOB list. See the PEI CIS.	None.
	EFI_SW_PS_PC_CREATE_HOB	Create a HOB. See the PEI CIS.	None.
	EFI_SW_PS_PC_FFS_FIND_ NEXT_VOLUME	Find the next FFS formatted firmware volume. See the PEI CIS.	None.
	EFI_SW_PS_PC_FFS_FIND_NEXT_ FILE	Find the next FFS file. See the PEI CIS.	None
	EFI_SW_PS_PC_FFS_FIND_ SECTION_DATA	Find a section in an FFS file. See the PEI CIS.	None.
	EFI_SW_PS_PC_INSTALL_PEI_ MEMORY	Install the PEI memory. See the PEI CIS.	None.
	EFI_SW_PS_PC_ALLOCATE_PAGES	Allocate pages from the memory heap. See the PEI CIS.	None.
	EFI_SW_PS_PC_ALLOCATE_POOL	Allocate from the memory heap. See the PEI CIS.	None.

continued

Table 3-58 Progress and Error Code Operations: PEI Subclass (continued)

Type of Code	Operation	Description	Extended Data
Progress (cont.)	EFI_SW_PS_PC_COPY_MEM	Copy memory. See the PEI CIS.	None
	EFI_SW_PS_PC_SET_MEM	Set a memory range to a specific value. See the PEI CIS.	None.
	0x1010–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

See the following topic in Code Definitions: Host Software Class for definitions of the subclass-specific operations listed above:

- Progress Code Definitions

Boot Services Subclass

This subclass applies to any boot service present in the EFI Boot Services Table.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the Host Software class, the table below lists the additional codes for this subclass. These progress codes are reported by the code that provides the specified boot service and not by the module that invokes the given boot service.

See "Related Definitions" below for links to the definitions of code listed in this table.

Table 3-59. Progress and Error Code Operations: Boot Services Subclass

Type of Code	Operation	Description	Extended Data
Progress	EFI_SW_BS_PC_RAISE_TPL	Raise the task priority level service; see EFI Specification. This code is an invalid operation because the status code driver uses this boot service. The status code driver cannot report its own status codes.	None.
	EFI_SW_BS_PC_RESTORE_TPL	Restore the task priority level service; see EFI Specification. This code is an invalid operation because the status code driver uses this boot service. The status code driver cannot report its own status codes.	None.

continued

Table 3-59 Progress and Error Code Operations: Boot Services Subclass (continued)

Type of Code	Operation	Description	Extended Data
Progress (cont.)	EFI_SW_BS_PC_ALLOCATE_PAGE	Allocate page service; see EFI Specification.	None.
	EFI_SW_BS_PC_FREE_PAGES	Free page service; see EFI Specification.	None.
	EFI_SW_BS_PC_GET_MEMORY_MAP	Get memory map service; see EFI Specification.	None.
	EFI_SW_BS_PC_ALLOCATE_POOL	Allocate pool service; see EFI Specification.	None.
	EFI_SW_BS_PC_FREE_POOL	Free pool service; see EFI Specification.	None.
	EFI_SW_BS_PC_CREATE_EVENT	CreateeEvent service; see EFI Specification.	None.
	EFI_SW_BS_PC_SET_TIMER	Set timer service; see EFI Specification.	None.
	EFI_SW_BS_PC_WAIT_FOR_EVENT	Wait for event service; see EFI Specification.	None.
	EFI_SW_BS_PC_SIGNAL_EVENT	Signal event service; see EFI Specification. This code is an invalid operation because the status code driver uses this boot service. The status code driver cannot report its own status codes.	None.
	EFI_SW_BS_PC_CLOSE_EVENT	Close event service; see EFI Specification.	None.
	EFI_SW_BS_PC_CHECK_EVENT	Check event service; see EFI Specification.	None.
	EFI_SW_BS_PC_INSTALL_ PROTOCOL_INTERFACE	Install protocol interface service; see EFI Specification.	None.
	EFI_SW_BS_PC_REINSTALL_ PROTOCOL_INTERFACE	Reinstall protocol interface service; see EFI Specification.	None.
	EFI_SW_BS_PC_UNINSTALL_ PROTOCOL_INTERFACE	Uninstall protocol interface service; see EFI Specification.	None.
	EFI_SW_BS_PC_HANDLE_ PROTOCOL	Handle protocol service; see EFI Specification.	None.
	EFI_SW_BS_PC_PC_HANDLE_ PROTOCOL	PC handle protocol service; see EFI Specification.	None.
	EFI_SW_BS_PC_REGISTER_ PROTOCOL_ NOTIFY	Register protocol notify service; see EFI Specification.	None.
	EFI_SW_BS_PC_LOCATE_HANDLE	Locate handle service; see EFI Specification.	None.

continued

Table 3-59 Progress and Error Code Operations: Boot Services Subclass (continued)

Type of Code	Operation	Description	Extended Data
Progress (cont.)	EFI_SW_BS_PC_INSTALL_ CONFIGURATION_TABLE	Install configuration table service; see EFI Specification.	None.
	EFI_SW_BS_PC_LOAD_IMAGE	Load image service; see EFI Specification.	None.
	EFI_SW_BS_PC_START_IMAGE	Start image service; see EFI Specification.	None.
	EFI_SW_BS_PC_EXIT	Exit service; see EFI Specification.	None.
	EFI_SW_BS_PC_UNLOAD_IMAGE	Unload image service; see EFI Specification.	None.
	EFI_SW_BS_PC_EXIT_BOOT_ SERVICES	Exit boot services service; see EFI Specification.	None.
	EFI_SW_BS_PC_GET_NEXT_ MONOTONIC_COUNT	Get next monotonic count service; see EFI Specification.	None.
	EFI_SW_BS_PC_STALL	Stall service; see EFI Specification.	None.
	EFI_SW_BS_PC_SET_WATCHDOG_ TIMER	Set watchdog timer service; see EFI Specification.	None.
	EFI_SW_BS_PC_CONNECT_ CONTROLLER	Connect controller service; see EFI Specification.	None.
	EFI_SW_BS_PC_DISCONNECT_ CONTROLLER	Disconnect controller service; see EFI Specification.	None.
	EFI_SW_BS_PC_OPEN_PROTOCOL	Open protocol service; see EFI Specification.	None.
	EFI_SW_BS_PC_CLOSE_PROTOCOL	Close protocol service; see EFI Specification.	None.
	EFI_SW_BS_PC_OPEN_PROTOCOL_ INFORMATION	Open protocol Information service; see EFI Specification.	None.
	EFI_SW_BS_PC_PROTOCOLS_PER_ HANDLE	Protocols per handle service; see EFI Specification.	None.
	EFI_SW_BS_PC_LOCATE_HANDLE_ BUFFER	Locate handle buffer service; see EFI Specification.	None.
	EFI_SW_BS_PC_LOCATE_PROTOCOL	Locate protocol service; see EFI Specification.	None.
	EFI_SW_BS_PC_INSTALL_MULTIPLE_ PROTOCOL_INTERFACES	Install multiple protocol interfaces service; see EFI Specification.	None.
	EFI_SW_BS_PC_UNINSTALL_ MULTIPLE_PROTOCOL_INTERFACES	Uninstall multiple protocol interfaces service; see EFI Specification.	None.
	EFI_SW_BS_PC_CALCULATE_ CRC_32	Calculate CRC32 service; see EFI Specification.	None.
	EFI_SW_BS_PC_COPY_MEM	Copy memory; see EFI Specification.	None.

continued

Table 3-59 Progress and Error Code Operations: Boot Services Subclass (continued)

Type of Code	Operation	Description	Extended Data
Progress (cont.)	EFI_SW_BS_PC_SET_MEM	Set memory to a specific value; see EFI Specification.	None.
	0x102A - 0x7FFF	Reserved for future use by this specification.	NA.
Error	0x1000 – 0x7FFF	Reserved for future use by this specification.	NA.

Related Definitions

See the following topic in Code Definitions: Host Software Class for definitions of the subclass-specific operations listed above:

- Progress Code Definitions

Runtime Services Subclass

This subclass applies to any runtime service present in the EFI Runtime Services Table.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the Host Software class, the table below lists the additional codes for this subclass. For obvious reasons, the runtime service **`ReportStatusCode()`** cannot report status codes related to the progress of the **`ReportStatusCode()`** function.

See "Related Definitions" below for links to the definitions of code listed in this table.

Table 3-60. Progress and Error Code Operations: Runtime Services Subclass

Type of Code	Operation	Description	Extended Data
Progress	EFI_SW_RS_PC_GET_TIME	Get time service; see EFI Specification.	None.
	EFI_SW_RS_PC_SET_TIME	Set time service; see EFI Specification.	None
	EFI_SW_RS_PC_GET_WAKEUP_TIME	Get wakeup time service; see EFI Specification.	None
	EFI_SW_RS_PC_SET_WAKEUP_TIME	Set wakeup time service; see EFI Specification.	None
	EFI_SW_RS_PC_SET_VIRTUAL_ ADDRESS_MAP	Set virtual address map service; see EFI Specification.	None
	EFI_SW_RS_PC_CONVERT_POINTER	Convert pointer service; see EFI Specification.	None
	EFI_SW_RS_PC_GET_ VARIABLE	Get variable service; see EFI Specification.	None

continued

Table 3-60 Progress and Error Code Operations: Runtime Services Subclass (continued)

Type of Code	Operation	Description	Extended Data
Progress (cont.)	EFI_SW_RS_PC_GET_NEXT_ VARIABLE_NAME	Get next variable name service; see EFI Specification.	None
	EFI_SW_RS_PC_SET_VARIABLE	Set variable service; see EFI Specification.	None
	EFI_SW_RS_PC_GET_NEXT_HIGH_ MONOTONIC_COUNT	Get next high monotonic count service; see EFI Specification.	None
	EFI_SW_RS_PC_RESET_SYSTEM	Reset system service; see EFI Specification.	None
	0x100B–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

See the following topic in Code Definitions: Host Software Class for definitions of the subclass-specific operations listed above:

- Progress Code Definitions

DXE Services Subclass

This subclass applies to any DXE Service that present in the EFI DXE Services Table.

Progress and Error Code Operations

In addition to the standard progress and error codes that are defined for the Host Software class, the table below lists the additional codes for this subclass.

See "Related Definitions" below for links to the definitions of code listed in this table.

Table 3-61. Progress and Error Code Operations: DXE Services Subclass

Type of Code	Operation	Description	Extended Data
Progress	EFI_SW_DS_PC_ADD_ MEMORY_SPACE	Add memory to GCD. See DXE CIS.	None
	EFI_SW_DS_PC_ALLOCATE_MEMORY_ SPACE	Allocate memory from GCD. See DXE CIS.	None
	EFI_SW_DS_PC_FREE_MEMORY_SPACE	Free memory from GCD. See DXE CIS.	None
	EFI_SW_DS_PC_REMOVE_MEMORY_ SPACE	Remove memory from GCD. See DXE CIS.	None
	EFI_SW_DS_PC_GET_MEMORY_SPACE_ DESCRIPTOR	Get memory descriptor from GCD. See DXE CIS.	None

continued

Table 3-61 Progress and Error Code Operations: DXE Services Subclass (continued)

Type of Code	Operation	Description	Extended Data
Progress (cont.)	EFI_SW_DS_PC_SET_MEMORY_SPACE_ATTRIBUTES	Set attributes of memory in GCD. See DXE CIS.	None
	EFI_SW_DS_PC_GET_MEMORY_SPACE_MAP	Get map of memory space from GCD. See DXE CIS.	None
	EFI_SW_DS_PC_ADD_IO_SPACE	Add I/O to GCD. See DXE CIS.	None
	EFI_SW_DS_PC_ALLOCATE_IO_SPACE	Allocate I/O from GCD. See DXE CIS.	None
	EFI_SW_DS_PC_FREE_IO_SPACE	Free I/O from GCD. See DXE CIS.	None
	EFI_SW_DS_PC_REMOVE_IO_SPACE	Remove I/O space from GCD. See DXE CIS.	None
	EFI_SW_DS_PC_GET_IO_SPACE_DESCRIPTOR	Get I/O space descriptor from GCD. See DXE CIS.	None
	EFI_SW_DS_PC_GET_IO_SPACE_MAP	Get map of I/O space from the GCD. See DXE CIS.	None
	EFI_SW_DS_PC_DISPATCH	Dispatch DXE drivers from a firmware volume. See DXE CIS.	None
	EFI_SW_DS_PC_SCHEDULE	Clear the schedule on request flag for a driver. See DXE CIS.	None
	EFI_SW_DS_PC_TRUST	Promote a file to trusted state. See DXE CIS.	None
	EFI_SW_DS_PC_PROCESS_FIRMWARE_VOLUME	Dispatch all drivers in a firmware volume. See DXE CIS.	None
	0x1011–0x7FFF	Reserved for future use by this specification.	NA
Error	0x1000–0x7FFF	Reserved for future use by this specification.	NA

Related Definitions

See the following topic in Code Definitions: Host Software Class for definitions of the subclass-specific operations listed above:

Progress Code Definitions

4
Code Definitions

Introduction

This section provides the code definitions for the following data types and structures for status codes:

- Data structures and types that are common to all status codes
- Progress, error, and debug codes that are common to all classes
- Class definitions
- Subclass definitions for each status code class
- Extended error data

Common Status Code Definitions

Common Status Code Definitions Overview

This section defines the data structures that are common to all status codes. For class- and subclass-specific information, see Class Definitions.

Data Structures

Status Code Common Data Structures

See the **`ReportStatusCode()`** declaration in the DXE CIS for definitions and details on the following basic data structures:

- `EFI_STATUS_CODE_TYPE` and defined severities
- `EFI_PROGRESS_CODE`
- `EFI_ERROR_CODE`
- `EFI_DEBUG_CODE`
- `EFI_STATUS_CODE_VALUE`

Extended Data Header

EFI_STATUS_CODE_DATA

Summary

The definition of the status code extended data header. The data will follow *HeaderSize* bytes from the beginning of the structure and is *Size* bytes long.

Related Definitions

```
typedef struct {
  UINT16    HeaderSize;
  UINT16    Size;
  EFI_GUID  Type;
} EFI_STATUS_CODE_DATA;
```

Parameters

HeaderSize

The size of the structure. This is specified to enable future expansion.

Size

The size of the data in bytes. This does not include the size of the header structure.

Type

The GUID defining the type of the data. The standard GUIDs and their associated data structures are defined in this specification.

Description

The status code information may be accompanied by optional extended data. The extended data begins with a header. The header contains a *Type* field that represents the format of the extended data following the header. This specification defines two GUIDs and their meaning. If these GUIDs are used, the extended data contents must follow this specification. Extended data formats that are not compliant with this specification are permitted, but they must use different GUIDs. The format of the extended data header is defined in the DXE CIS, but it is duplicated here for convenience.

EFI_STATUS_CODE_STRING_DATA

Summary

Defines a string type of extended data.

GUID

```
#define EFI_STATUS_CODE_DATA_TYPE_STRING_GUID \
{ 0x92D11080, 0x496F, 0x4D95, 0xBE, 0x7E, 0x03, 0x74, 0x88, 0x38,
0x2B, 0x0A }
```

Prototype

```
typedef struct {
  EFI_STATUS_CODE_DATA                    DataHeader;
  EFI_STRING_TYPE                         StringType;
  EFI_STATUS_CODE_STRING                  String;
} EFI_STATUS_CODE_STRING_DATA;
```

Parameters

DataHeader

The data header identifying the data. *DataHeader.HeaderSize* should be **sizeof (EFI_STATUS_CODE_DATA)**, *DataHeader.Size* should be **sizeof (EFI_STATUS_CODE_STRING_DATA) –** *HeaderSize*, and *DataHeader.Type* should be **EFI_STATUS_CODE_DATA_TYPE_STRING_GUID**.

StringType

Specifies if the string is ASCII or Unicode. Type **EFI_STRING_TYPE** is defined in "Related Definitions" below.

String

A pointer to a null-terminated ASCII or Unicode string. Type **EFI_STRING_TYPE** is defined in "Related Definitions" below.

Description

This data type defines a string type of extended data. A string can accompany any status code. The string can provide additional information about the status code. The string can be ASCII, Unicode, or an HII token/GUID pair.

Related Definitions

```
//*********************************************
// EFI_STRING_TYPE
//*********************************************

typedef enum {
  EfiStringAscii,
  EfiStringUnicode,
  EfiStringToken
} EFI_STRING_TYPE;
```

EfiStringAscii

A **NULL**-terminated ASCII string.

EfiStringUnicode

A double **NULL**-terminated Unicode string.

EfiStringToken

An **EFI_STATUS_CODE_STRING_TOKEN** representing the string. The actual string can be obtained by querying the HII database.

```
//*********************************************
// EFI_STATUS_CODE_STRING_TOKEN
//*********************************************

//
// HII string token
//
typedef struct {
  EFI_HII_HANDLE  Handle;
  STRING_REF      Token;
} EFI_STATUS_CODE_STRING_TOKEN;
```

Handle

The HII handle of the string pack, which can be used to retrieve the string. It is a dynamic value that may not be the same for different boots. Type **EFI_HII_HANDLE** is defined in **EFI_HII_PROTOCOL.NewPack()** in the *Intel® Platform Innovation Framework for EFI Architecture Human Interface Infrastructure Specification.*

Token

When combined with the HII handle, the string token can be used to retrieve the string. Type **STRING_REF** is defined in **EFI_HII_STRING_PACK** in the *Intel® Platform Innovation Framework for EFI Architecture Human Interface Infrastructure Specification.*

```
//*********************************************
// EFI_STATUS_CODE_STRING
//*********************************************

//
// String structure
//
typedef union {
  CHAR8                          Ascii[];
  CHAR16                         Unicode[];
  EFI_STATUS_CODE_STRING_TOKEN   Hii;
} EFI_STATUS_CODE_STRING;
```

Ascii

ASCII formatted string.

Unicode

Unicode formatted string.

Hii

HII handle/token pair. Type **EFI_STATUS_CODE_STRING_TOKEN** is defined above.

Status Code-Specific Data GUID

EFI_STATUS_CODE_SPECIFIC_DATA_GUID

Summary

Indicates that the format of the accompanying data depends upon the status code value but follows this specification.

GUID

```
#define EFI_STATUS_CODE_SPECIFIC_DATA_GUID \
   {0x335984bd,0xe805,0x409a,0xb8,0xf8,0xd2,0x7e,
   0xce,0x5f,0xf7,0xa6}
```

Description

This GUID indicates that the format of the accompanying data depends upon the status code value but follows this specification. This specification defines the format of the extended data for several status code values. For example, **EFI_DEBUG_ASSERT_DATA** defines the extended error data for the error code **EFI_SW_EC_ILLEGAL_SOFTWARE_STATE**. The agent reporting this error condition can use this GUID if the extended data follows the format defined in **EFI_DEBUG_ASSERT_DATA**.

If the consumer of the status code detects this GUID, it must look up the status code value to correctly interpret the contents of the extended data.

This specification declares certain ranges of status code values as OEM specific. Because this specification does not define the meaning of status codes in these ranges, the extended data for these cannot use this GUID. The OEM defining the meaning of the status codes is responsible for defining the GUID that is to be used for associated extended data.

Enumeration Schemes

Operation Code Enumeration Scheme

Summary

All operation codes (regardless of class and subclass) use the progress code partitioning scheme listed in the table below.

Table 4-1. Progress Code Enumeration Scheme

Operation	Description
0x0000–0x0FFF	These operation codes are common to all the subclasses in a given class. These values are used to represent operations that are common to all subclasses in a given class. For example, all the I/O buses in the I/O Bus subclasses share an operation code that represents the reset operation, which is a common operation for most buses. It is possible that certain operation codes in this range will not be applicable to certain subclasses. It is also possible that the format of the extended data will vary from one subclass to another. If the subclass does not define the format of the extended data, extended data is not required. These codes are reserved by this specification.
0x1000–0x7FFF	These operation codes are specific to the subclass and represent operations that are specific to the subclass. These codes are reserved by this specification.
0x8000–0xFFFF	Reserved for OEM use.

Prototype

```
//
// General partitioning scheme for Progress and Error Codes
// 0x0000-0x0FFF  - Shared by all subclasses in a given class
// 0x1000-0x7FFF  - Subclass Specific
// 0x8000-0xFFFF  - OEM specific
//
#define EFI_SUBCLASS_SPECIFIC              0x1000
#define EFI_OEM_SPECIFIC                   0x8000
```

Debug Code Enumeration Scheme

Summary

All classes share these debug operation codes. It is not currently expected that operation codes have a lot of meaning for debug information. Only one debug code is currently defined by this specification and it is shared by all classes and subclasses.

Table 4-2. Debug Code Enumeration Scheme

Debug Code	Description
0x0000–0x7FFF	Reserved for future use by this specification.
0x8000–0xFFFF	Reserved for OEM use.

Prototype

```
//
// Debug Code definitions for all classes and subclass
// Only one debug code is defined at this point and should
// be used for anything that gets sent to debug stream.
//
#define  EFI_DC_UNSPECIFIED      0x0
```

Extended Error Data

EFI_DEVICE_PATH_EXTENDED_DATA

Summary

Extended data about the device path, which is used for many errors and progress codes to point to the device.

Prototype

```
typedef struct {
  EFI_STATUS_CODE_DATA                DataHeader;
  UINT8                               DevicePath[];
} EFI_DEVICE_PATH_EXTENDED_DATA;
```

Parameters

DataHeader

The data header identifying the data. *DataHeader.HeaderSize* should be **sizeof (EFI_STATUS_CODE_DATA)**. *DataHeader.Size* should be the size of variable-length *DevicePath*, and *DataHeader.Size* is zero for a virtual device that does not have a device path. *DataHeader.Type* should be **EFI_STATUS_CODE_SPECIFIC_DATA_GUID**.

DevicePath

The device path to the controller or the hardware device. Note that this parameter is a variable-length device path structure and not a pointer to such a structure. This structure is populated only if it is a physical device. For virtual devices, the *Size* field in *DataHeader* is set to zero and this field is not populated.

Description

The device path is used to point to the physical device in case there is more than one device belonging to the same subclass. For example, the system may contain two USB keyboards and one PS/2* keyboard. The driver that parses the status code can use the device path extended data to differentiate between the three. The index field is not useful in this case because there is no standard numbering convention. Device paths are preferred over using device handles because device handles for a given device can change from one boot to another and do not mean anything beyond Boot Services time. In certain cases, the bus driver may not create a device handle for a given device if it detects a critical error. In these cases, the device path extended data can be used to refer to the device, but there may not be any device handles with an instance of **EFI_DEVICE_PATH_PROTOCOL** that matches *DevicePath*. The variable device path structure is included in this structure to make it self sufficient. This property is important for consumers that may read this data from a data repository such as the data hub.

EFI_DEVICE_HANDLE_EXTENDED_DATA

Summary

Extended data about the device handle, which is used for many errors and progress codes to point to the device.

Prototype

```
typedef struct {
  EFI_STATUS_CODE_DATA                  DataHeader;
  EFI_HANDLE                            Handle;
} EFI_DEVICE_HANDLE_EXTENDED_DATA;
```

Parameters

DataHeader

The data header identifying the data. *DataHeader.HeaderSize* should be **sizeof (EFI_STATUS_CODE_DATA)**, *DataHeader.Size* should be **sizeof (EFI_DEVICE_HANDLE_EXTENDED_DATA) -** *HeaderSize*, and *DataHeader.Type* should be **EFI_STATUS_CODE_SPECIFIC_DATA_GUID**.

Handle

The device handle.

Description

The handle of the device with which the progress or error code is associated. The handle is guaranteed to be accurate only at the time the status code is reported. Handles are dynamic entities between boots, so handles cannot be considered to be valid if the system has reset subsequent to the status code being reported. Handles may be used to determine a wide variety of useful information about the source of the status code.

EFI_RESOURCE_ALLOC_FAILURE_ERROR_DATA

Summary

This structure defines extended data describing a PCI resource allocation error.

Prototype

NOTE

The following structure contains variable-length fields and cannot be defined as a C-style structure.

```
typedef struct.{
  EFI_STATUS_CODE_DATA                DataHeader;
  UINT32                              Bar;
  UINT16                              DevicePathSize;
  UINT16                              ReqResSize;
  UINT16                              AllocResSize;
  UINT8                               DevicePath[];
  UINT8                               ReqRes[];
  UINT8                               AllocRes[];
) EFI_RESOURCE_ALLOC_FAILURE_ERROR_DATA
```

Parameters

DataHeader

The data header identifying the data. *DataHeader.HeaderSize* should be **sizeof (EFI_STATUS_CODE_DATA)**, *DataHeader.Size* should be **(***DevicePathSize* **+** *DevicePathSize* **+** *DevicePathSize* **+ sizeof(UINT32) + 3 * sizeof (UINT16))**, and *DataHeader.Type* should be **EFI_STATUS_CODE_SPECIFIC_DATA_GUID**.

Bar

The PCI BAR. Applicable only for PCI devices. Ignored for all other devices.

DevicePathSize

DevicePathSize should be zero if it is a virtual device that is not associated with a device path. Otherwise, this parameter is the length of the variable-length *DevicePath*.

ReqResSize

Represents the size the *ReqRes* parameter. *ReqResSize* should be zero if the requested resources are not provided as a part of extended data.

AllocResSize

Represents the size the *AllocRes* parameter. *AllocResSize* should be zero if the allocated resources are not provided as a part of extended data.

DevicePath

The device path to the controller or the hardware device that did not get the requested resources. Note that this parameter is the variable-length device path structure and not a pointer to this structure.

ReqRes

The requested resources in the format of an ACPI 2.0 resource descriptor. This parameter is not a pointer; it is the complete resource descriptor.

AllocRes

The allocated resources in the format of an ACPI 2.0 resource descriptor. This parameter is not a pointer; it is the complete resource descriptor.

Description

This extended data conveys details for a PCI resource allocation failure error. See the PCI specification and the ACPI specification for details on PCI resource allocations and the format for resource descriptors. This error does not detail why the resource allocation failed. It may be due to a bad resource request or a lack of available resources to satisfy a valid request. The variable device path structure and the resource structures are included in this structure to make it self sufficient. This property is important for consumers that may read this data from a data repository such as the data hub.

Class Definitions

Summary

Classes correspond to broad types of system pieces. These types are chosen to provide a reasonable initial classification of the system entity whose status is represented. There are three classes of hardware and one class for software. These classes are listed in the table below. Each class is made up of several subclasses. See Status Code Classes for descriptions of each of these classes.

Table 4-3. Class Definitions

Type of Class	Class Name	Data Type Name
Hardware	Computing Unit	EFI_COMPUTING_UNIT
	User-Accessible Peripherals	EFI_PERIPHERAL
	I/O Bus	EFI_IO_BUS
Software	Host Software	EFI_SOFTWARE

Prototype

```
//
// Class definitions
// Values of 4-127 are reserved for future use by this
// specification.
// Values in the range 127-255 are reserved for OEM use.
//
#define EFI_COMPUTING_UNIT                      0x00000000
#define EFI_PERIPHERAL                          0x01000000
#define EFI_IO_BUS                              0x02000000
#define EFI_SOFTWARE                            0x03000000
```

Hardware Classes

Computing Unit Class

EFI_COMPUTING_UNIT Class

The table below lists the subclasses defined in the Computing Unit class. See Subclass Definitions for their code definitions.

Table 4-4. Defined Subclasses: Computing Unit Class

Subclass	Code Name
Unspecified	EFI_COMPUTING_UNIT_UNSPECIFIED
Host processor	EFI_COMPUTING_UNIT_HOST_PROCESSOR
Firmware processor	EFI_COMPUTING_UNIT_FIRMWARE_PROCESSOR
Service processor	EFI_COMPUTING_UNIT_SERVICE_PROCESSOR
I/O processor	EFI_COMPUTING_UNIT_IO_PROCESSOR
Cache	EFI_COMPUTING_UNIT_CACHE
Memory	EFI_COMPUTING_UNIT_MEMORY
Chipset	EFI_COMPUTING_UNIT_CHIPSET

Subclass Definitions

Summary

Definitions for the Computing Unit subclasses. See Subclasses in Status Code Classes: Computing Unit Class for descriptions of these subclasses.

Prototype

```
//
// Computing Unit Subclass definitions.
// Values of 8-127 are reserved for future use by this
// specification.
// Values of 128-255 are reserved for OEM use.
//
#define EFI_COMPUTING_UNIT_UNSPECIFIED    (EFI_COMPUTING_UNIT |
0x00000000)
#define EFI_COMPUTING_UNIT_HOST_PROCESSOR (EFI_COMPUTING_UNIT |
0x00010000)
#define EFI_COMPUTING_UNIT_FIRMWARE_PROCESSOR
                                          (EFI_COMPUTING_UNIT |
0x00020000)
#define EFI_COMPUTING_UNIT_IO_PROCESSOR   (EFI_COMPUTING_UNIT |
0x00030000)
#define EFI_COMPUTING_UNIT_CACHE          (EFI_COMPUTING_UNIT |
0x00040000)
#define EFI_COMPUTING_UNIT_MEMORY         (EFI_COMPUTING_UNIT |
0x00050000)
#define EFI_COMPUTING_UNIT_CHIPSET        (EFI_COMPUTING_UNIT |
0x00060000)
```

Progress Code Definitions

Summary

Progress code definitions for the Computing Unit class and all subclasses. See Progress Code Operations in Status Code Classes: Computing Unit Class for descriptions of these progress codes.

The following subclasses define additional subclass-specific progress code operations, which are included below:

- Host processor
- Cache
- Memory

Prototype

```
//
// Computing Unit Class Progress Code definitions.
// These are shared by all subclasses.
//
#define EFI_CU_PC_INIT_BEGIN           0x00000000
#define EFI_CU_PC_INIT_END             0x00000001


//
// Computing Unit Unspecified Subclass Progress Code definitions.
//


//
// Computing Unit Host Processor Subclass Progress Code definitions.
//
#define EFI_CU_HP_PC_POWER_ON_INIT     (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_CU_HP_PC_CACHE_INIT        (EFI_SUBCLASS_SPECIFIC | 0x00000001)
#define EFI_CU_HP_PC_RAM_INIT          (EFI_SUBCLASS_SPECIFIC | 0x00000002)
#define EFI_CU_HP_PC_MEMORY_CONTROLLER_INIT
                                       (EFI_SUBCLASS_SPECIFIC | 0x00000003)
```

```
#define EFI_CU_HP_PC_IO_INIT            (EFI_SUBCLASS_SPECIFIC | 0x00000004)
#define EFI_CU_HP_PC_BSP_SELECT         (EFI_SUBCLASS_SPECIFIC | 0x00000005)
#define EFI_CU_HP_PC_BSP_RESELECT       (EFI_SUBCLASS_SPECIFIC | 0x00000006)
#define EFI_CU_HP_PC_AP_INIT            (EFI_SUBCLASS_SPECIFIC | 0x00000007)
#define EFI_CU_HP_PC_SMM_INIT           (EFI_SUBCLASS_SPECIFIC | 0x00000008)


//
// Computing Unit Firmware Processor Subclass Progress Code definitions.
//


//
// Computing Unit IO Processor Subclass Progress Code definitions.
//


//
// Computing Unit Cache Subclass Progress Code definitions.
//
#define EFI_CU_CACHE_PC_PRESENCE_DETECT
                                        (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_CU_CACHE_PC_CONFIGURATION   (EFI_SUBCLASS_SPECIFIC | 0x00000001)


//
// Computing Unit Memory Subclass Progress Code definitions.
//
#define EFI_CU_MEMORY_PC_SPD_READ       (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_CU_MEMORY_PC_PRESENCE_DETECT
                                        (EFI_SUBCLASS_SPECIFIC | 0x00000001)
#define EFI_CU_MEMORY_PC_TIMING         (EFI_SUBCLASS_SPECIFIC | 0x00000002)
#define EFI_CU_MEMORY_PC_CONFIGURING    (EFI_SUBCLASS_SPECIFIC | 0x00000003)
#define EFI_CU_MEMORY_PC_OPTIMIZING     (EFI_SUBCLASS_SPECIFIC | 0x00000004)
#define EFI_CU_MEMORY_PC_INIT           (EFI_SUBCLASS_SPECIFIC | 0x00000005)
#define EFI_CU_MEMORY_PC_TEST           (EFI_SUBCLASS_SPECIFIC | 0x00000006)


//
// Computing Unit Chipset Subclass Progress Code definitions.
//
```

Error Code Definitions

Summary

Error code definitions for the Computing Unit class and all subclasses. See Error Code Operations in Status Code Classes: Computing Unit Class for descriptions of these error codes.

The following subclasses define additional subclass-specific error code operations, which are included below:

- Host processor
- Firmware processor
- Cache
- Memory

Prototype

```
//
// Computing Unit Class Error Code definitions.
// These are shared by all subclasses.
//
#define EFI_CU_EC_NON_SPECIFIC          0x00000000
#define EFI_CU_EC_DISABLED              0x00000001
#define EFI_CU_EC_NOT_SUPPORTED         0x00000002
#define EFI_CU_EC_NOT_DETECTED          0x00000003
#define EFI_CU_EC_NOT_CONFIGURED        0x00000004


//
// Computing Unit Unspecified Subclass Error Code definitions.
//


//
// Computing Unit Host Processor Subclass Error Code definitions.
//
#define EFI_CU_HP_EC_INVALID_TYPE         (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_CU_HP_EC_INVALID_SPEED        (EFI_SUBCLASS_SPECIFIC | 0x00000001)
#define EFI_CU_HP_EC_MISMATCH             (EFI_SUBCLASS_SPECIFIC | 0x00000002)
#define EFI_CU_HP_EC_TIMER_EXPIRED        (EFI_SUBCLASS_SPECIFIC | 0x00000003)
#define EFI_CU_HP_EC_SELF_TEST            (EFI_SUBCLASS_SPECIFIC | 0x00000004)
#define EFI_CU_HP_EC_INTERNAL             (EFI_SUBCLASS_SPECIFIC | 0x00000005)
#define EFI_CU_HP_EC_THERMAL              (EFI_SUBCLASS_SPECIFIC | 0x00000006)
#define EFI_CU_HP_EC_LOW_VOLTAGE          (EFI_SUBCLASS_SPECIFIC | 0x00000007)
#define EFI_CU_HP_EC_HIGH_VOLTAGE         (EFI_SUBCLASS_SPECIFIC | 0x00000008)
#define EFI_CU_HP_EC_CACHE                (EFI_SUBCLASS_SPECIFIC | 0x00000009)
#define EFI_CU_HP_EC_MICROCODE_UPDATE     (EFI_SUBCLASS_SPECIFIC | 0x0000000A)
#define EFI_CU_HP_EC_CORRECTABLE          (EFI_SUBCLASS_SPECIFIC | 0x0000000B)
#define EFI_CU_HP_EC_UNCORRECTABLE        (EFI_SUBCLASS_SPECIFIC | 0x0000000C)
#define EFI_CU_HP_EC_NO_MICROCODE_UPDATE  (EFI_SUBCLASS_SPECIFIC | 0x0000000D)

//
// Computing Unit Firmware Processor Subclass Error Code definitions.
//
#define EFI_CU_FP_EC_HARD_FAIL          (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_CU_FP_EC_SOFT_FAIL          (EFI_SUBCLASS_SPECIFIC | 0x00000001)
#define EFI_CU_FP_EC_COMM_ERROR         (EFI_SUBCLASS_SPECIFIC | 0x00000002)
```

```
//
// Computing Unit IO Processor Subclass Error Code definitions.
//


//
// Computing Unit Cache Subclass Error Code definitions.
//
#define EFI_CU_CACHE_EC_INVALID_TYPE    (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_CU_CACHE_EC_INVALID_SPEED   (EFI_SUBCLASS_SPECIFIC | 0x00000001)
#define EFI_CU_CACHE_EC_INVALID_SIZE    (EFI_SUBCLASS_SPECIFIC | 0x00000002)
#define EFI_CU_CACHE_EC_MISMATCH        (EFI_SUBCLASS_SPECIFIC | 0x00000003)


//
// Computing Unit Memory Subclass Error Code definitions.
//
#define EFI_CU_MEMORY_EC_INVALID_TYPE   (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_CU_MEMORY_EC_INVALID_SPEED  (EFI_SUBCLASS_SPECIFIC | 0x00000001)
#define EFI_CU_MEMORY_EC_CORRECTABLE    (EFI_SUBCLASS_SPECIFIC | 0x00000002)
#define EFI_CU_MEMORY_EC_UNCORRECTABLE  (EFI_SUBCLASS_SPECIFIC | 0x00000003)
#define EFI_CU_MEMORY_EC_SPD_FAIL       (EFI_SUBCLASS_SPECIFIC | 0x00000004)
#define EFI_CU_MEMORY_EC_INVALID_SIZE   (EFI_SUBCLASS_SPECIFIC | 0x00000005)
#define EFI_CU_MEMORY_EC_MISMATCH       (EFI_SUBCLASS_SPECIFIC | 0x00000006)
#define EFI_CU_MEMORY_EC_S3_RESUME_FAIL
                                        (EFI_SUBCLASS_SPECIFIC | 0x00000007)
#define EFI_CU_MEMORY_EC_UPDATE_FAIL    (EFI_SUBCLASS_SPECIFIC | 0x00000008)
#define EFI_CU_MEMORY_EC_NONE_DETECTED  (EFI_SUBCLASS_SPECIFIC | 0x00000009)
#define EFI_CU_MEMORY_EC_NONE_USEFUL    (EFI_SUBCLASS_SPECIFIC | 0x0000000A)


//
// Computing Unit Chipset Subclass Error Code definitions.
//
```

Extended Error Data

Host Processor Subclass

EFI_COMPUTING_UNIT_VOLTAGE_ERROR_DATA

Summary

This structure provides details about the computing unit voltage error.

Prototype

```
typedef struct {
  EFI_STATUS_CODE_DATA                  DataHeader;
  EFI_EXP_BASE10_DATA                   Voltage;
  EFI_EXP_BASE10_DATA                   Threshold;
} EFI_COMPUTING_UNIT_VOLTAGE_ERROR_DATA;
```

Parameters

DataHeader

The data header identifying the data. *DataHeader.HeaderSize* should be **sizeof (EFI_STATUS_CODE_DATA)**, *DataHeader.Size* should be **sizeof (EFI_COMPUTING_UNIT_VOLTAGE_ERROR_DATA) -** *HeaderSize*, and *DataHeader.Type* should be **EFI_STATUS_CODE_SPECIFIC_DATA_GUID**.

Voltage

The voltage value at the time of the error.

Threshold

The voltage threshold.

Description

This structure provides the voltage at the time of error. It also provides the threshold value indicating the minimum or maximum voltage that is considered an error. If the voltage is less then the threshold, the error indicates that the voltage fell below the minimum acceptable value. If the voltage is greater then the threshold, the error indicates that the voltage rose above the maximum acceptable value.

EFI_COMPUTING_UNIT_MICROCODE_UPDATE_ERROR_DATA

Summary

This structure provides details about the microcode update error.

Prototype

```
typedef struct {
  EFI_STATUS_CODE_DATA                    DataHeader;
  UINT32                                  Version;
} EFI_COMPUTING_UNIT_MICROCODE_UPDATE_ERROR_DATA;
```

Parameters

DataHeader

The data header identifying the data. *DataHeader.HeaderSize* should be **sizeof (EFI_STATUS_CODE_DATA)**, *DataHeader.Size* should be **sizeof (EFI_COMPUTING_UNIT_MICROCODE_UPDATE_ERROR_DATA) -** *HeaderSize*, and *DataHeader.Type* should be **EFI_STATUS_CODE_SPECIFIC_DATA_GUID**.

Version

The version of the microcode update from the header.

EFI_COMPUTING_UNIT_TIMER_EXPIRED_ERROR_DATA

Summary

This structure provides details about the computing unit timer expiration error.

Prototype

```
typedef struct {
  EFI_STATUS_CODE_DATA                  DataHeader;
  EFI_EXP_BASE10_DATA                   TimerLimit;
} EFI_COMPUTING_UNIT_TIMER_EXPIRED_ERROR_DATA;
```

Parameters

DataHeader

The data header identifying the data. *DataHeader.HeaderSize* should be **sizeof (EFI_STATUS_CODE_DATA)**, *DataHeader.Size* should be **sizeof (EFI_COMPUTING_UNIT_TIMER_EXPIRED_ERROR_DATA) -** *HeaderSize*, and *DataHeader.Type* should be **EFI_STATUS_CODE_SPECIFIC_DATA_GUID**.

TimerLimit

The number of seconds that the computing unit timer was configured to expire.

Description

The timer limit provides the timeout value of the timer prior to expiration.

EFI_HOST_PROCESSOR_MISMATCH_ERROR_DATA

Summary

This structure defines extended data for processor mismatch errors.

Prototype

```
typedef struct {
  EFI_STATUS_CODE_DATA                    DataHeader;
  UINT32                                  Instance;
  UINT16                                  Attributes;
} EFI_HOST_PROCESSOR_MISMATCH_ERROR_DATA;
```

Parameters

DataHeader

The data header identifying the data. *DataHeader.HeaderSize* should be **sizeof (EFI_STATUS_CODE_DATA)**, *DataHeader.Size* should be **sizeof (EFI_ HOST_PROCESSOR_MISMATCH_ERROR_DATA) -** *HeaderSize* , and *DataHeader.Type* should be **EFI_STATUS_CODE_SPECIFIC_DATA_GUID**.

Instance

The unit number of the computing unit that does not match.

Attributes

The attributes describing the failure. See "Related Definitions" below for the type declarations.

Description

This provides information to indicate which processors mismatch, and how they mismatch. The status code contains the instance number of the processor that is in error. This structure's *Instance* indicates the second processor that does not match. This differentiation allows the consumer to determine which two processors do not match. The *Attributes* indicate what mismatch is being reported. Because *Attributes* is a bit field, more than one mismatch can be reported with one error code.

Related Definitions

```
//*******************************************************
// EFI_COMPUTING_UNIT_MISMATCH_ATTRIBUTES
//*******************************************************
//
// All other attributes are reserved for future use and
// must be initialized to 0.
//
#define EFI_COMPUTING_UNIT_MISMATCH_SPEED       0x0001
#define EFI_COMPUTING_UNIT_MISMATCH_FSB_SPEED   0x0002
#define EFI_COMPUTING_UNIT_MISMATCH_FAMILY      0x0004
#define EFI_COMPUTING_UNIT_MISMATCH_MODEL       0x0008
#define EFI_COMPUTING_UNIT_MISMATCH_STEPPING    0x0010
#define EFI_COMPUTING_UNIT_MISMATCH_CACHE_SIZE  0x0020
#define EFI_COMPUTING_UNIT_MISMATCH_OEM1        0x1000
#define EFI_COMPUTING_UNIT_MISMATCH_OEM2        0x2000
#define EFI_COMPUTING_UNIT_MISMATCH_OEM3        0x4000
#define EFI_COMPUTING_UNIT_MISMATCH_OEM4        0x8000
```

EFI_COMPUTING_UNIT_THERMAL_ERROR_DATA

Summary

This structure provides details about the computing unit thermal failure.

Prototype

```
typedef struct {
  EFI_STATUS_CODE_DATA                  DataHeader;
  EFI_EXP_BASE10_DATA                   Temperature;
  EFI_EXP_BASE10_DATA                   Threshold;
} EFI_COMPUTING_UNIT_THERMAL_ERROR_DATA;
```

Parameters

DataHeader

The data header identifying the data. *DataHeader.HeaderSize* should be **sizeof (EFI_STATUS_CODE_DATA)**, *DataHeader.Size* should be **sizeof (EFI_COMPUTING_UNIT_THERMAL_ERROR_DATA) -** *HeaderSize* , and *DataHeader.Type* should be **EFI_STATUS_CODE_SPECIFIC_DATA_GUID**.

Temperature

The thermal value at the time of the error.

Threshold

The thermal threshold.

Description

This structure provides the temperature at the time of error. It also provides the threshold value indicating the minimum temperature that is considered an error.

EFI_CACHE_INIT_DATA

Summary

This structure provides cache initialization data.

Prototype

```
typedef struct {
  EFI_STATUS_CODE_DATA                DataHeader;
  UINT32                              Level;
  EFI_INIT_CACHE_TYPE                 Type;
} EFI_CACHE_INIT_DATA;
```

Parameters

DataHeader

The data header identifying the data. *DataHeader.HeaderSize* should be **sizeof (EFI_STATUS_CODE_DATA)**, *DataHeader.Size* should be **sizeof (EFI_CACHE_INIT_DATA) -** *HeaderSize*, and *DataHeader.Type* should be **EFI_STATUS_CODE_SPECIFIC_DATA_GUID**.

Level

The cache level. Starts with 1 for level 1 cache.

Type

The type of cache. Type **EFI_INIT_CACHE_TYPE** is defined in "Related Definitions" below.

Description

This structure contains the cache level and type information.

Related Definitions

```
//**********************************************
// EFI_INIT_CACHE_TYPE
//**********************************************

// Valid cache types

typedef enum {
  EfiInitCacheDataOnly,
  EfiInitCacheInstrOnly,
  EfiInitCacheBoth,
  EfiInitCacheUnspecified
} EFI_INIT_CACHE_TYPE;
```

EFI_COMPUTING_UNIT_CPU_DISABLED_ERROR_DATA

Summary

This structure provides information about the disabled computing unit.

Prototype

```
typedef struct {
  EFI_STATUS_CODE_DATA     DataHeader;
  UINT32                   Cause;
  BOOLEAN                  SoftwareDisabled;
} EFI_COMPUTING_UNIT_CPU_DISABLED_ERROR_DATA;
```

Parameters

DataHeader

The data header identifying the data. *DataHeader.HeaderSize* should be **sizeof (EFI_STATUS_CODE_DATA)**, *DataHeader.Size* should be **sizeof (EFI_COMPUTING_UNIT_CPU_DISABLED_ERROR_DATA) -** *HeaderSize*, and *DataHeader.Type* should be **EFI_STATUS_CODE_SPECIFIC_DATA_GUID**.

Cause

The reason for disabling the processor. See "Related Definitions" below for defined values.

SoftwareDisabled

TRUE if the processor is disabled via software means such as not listing it in the ACPI tables. Such a processor will respond to Interprocessor Interrupts (IPIs). **FALSE** if the processor is hardware disabled, which means it is invisible to software and will not respond to IPIs.

Description

This structure provides details as to why and how the computing unit was disabled. The causes should cover the typical reasons a processor would be disabled. How the processor was disabled is important because there are distinct differences between hardware and software disabling.

Related Definitions

```
//*******************************************************
// EFI_CPU_STATE_CHANGE_CAUSE
//*******************************************************
typedef UINT32    EFI_CPU_STATE_CHANGE_CAUSE;

//
// The reason a processor was disabled
//
#define EFI_CPU_CAUSE_INTERNAL_ERROR          0x0001
#define EFI_CPU_CAUSE_THERMAL_ERROR           0x0002
#define EFI_CPU_CAUSE_SELFTEST_FAILURE        0x0004
#define EFI_CPU_CAUSE_PREBOOT_TIMEOUT         0x0008
#define EFI_CPU_CAUSE_FAILED_TO_START         0x0010
#define EFI_CPU_CAUSE_CONFIG_ERROR            0x0020
#define EFI_CPU_CAUSE_USER_SELECTION          0x0080
#define EFI_CPU_CAUSE_BY_ASSOCIATION          0x0100
#define EFI_CPU_CAUSE_UNSPECIFIED             0x8000
```

Following is a description of the fields in the above definition.

EFI_CPU_CAUSE_INTERNAL_ERROR	The processor was disabled because it signaled an internal error (IERR).
EFI_CPU_CAUSE_THERMAL_ERROR	The processor was disabled because of a thermal error.
EFI_CPU_CAUSE_SELFTEST_FAILURE	The processor was disabled because it failed BIST.
EFI_CPU_CAUSE_PREBOOT_TIMEOUT	The processor started execution, but it timed out during a particular task and was therefore disabled.
EFI_CPU_CAUSE_FAILED_TO_START	The processor was disabled because it failed to start execution (FRB-3 timeout).
EFI_CPU_CAUSE_CONFIG_ERROR	The processor was disabled due to a configuration error.
EFI_CPU_CAUSE_USER_SELECTION	The processor state was changed due to user selection. Applicable to enabling and disabling of processors.
EFI_CPU_CAUSE_BY_ASSOCIATION	The processor state was changed due because it shared the state with another processor and the state of the other processor was changed.
EFI_CPU_CAUSE_UNSPECIFIED	The CPU state was changed due to unspecified reason. Applicable to enabling and disabling of processors.

Memory Subclass

EFI_MEMORY_EXTENDED_ERROR_DATA

Summary

This structure defines extended data describing a memory error.

Prototype

```
typedef struct {
  EFI_STATUS_CODE_DATA                DataHeader;
  EFI_MEMORY_ERROR_GRANULARITY        Granularity;
  EFI_MEMORY_ERROR_OPERATION          Operation;
  UINT32                              Syndrome;
  EFI_PHYSICAL_ADDRESS                Address;
  UINTN                               Resolution;
} EFI_MEMORY_EXTENDED_ERROR_DATA;
```

Parameters

DataHeader

The data header identifying the data. *DataHeader.HeaderSize* should be **sizeof (EFI_STATUS_CODE_DATA)**, *DataHeader.Size* should be **sizeof (EFI_MEMORY_EXTENDED_ERROR_DATA) -** *HeaderSize*, and *DataHeader.Type* should be **EFI_STATUS_CODE_SPECIFIC_DATA_GUID**.

Granularity

The error granularity type. Type **EFI_MEMORY_ERROR_GRANULARITY** is defined in "Related Definitions" below.

Operation

The operation that resulted in the error being detected. Type **EFI_MEMORY_ERROR_OPERATION** is defined in "Related Definitions" below.

Syndrome

The error syndrome, vendor-specific ECC syndrome, or CRC data associated with the error. If unknown, should be initialized to 0.

Address

The physical address of the error. Type **EFI_PHYSICAL_ADDRESS** is defined in **AllocatePages()** in the *EFI 1.10 Specification.*

Resolution

The range, in bytes, within which the error address can be determined.

Description

This structure provides specific details about the memory error that was detected. It provides enough information so that consumers can identify the exact failure and provides enough information to enable corrective action if necessary.

Related Definitions

```
//*************************************************************
// EFI_MEMORY_ERROR_GRANULARITY
//*************************************************************
typedef UINT8 EFI_MEMORY_ERROR_GRANULARITY;

//
// Memory Error Granularities
//
#define EFI_MEMORY_ERROR_OTHER                  0x01
#define EFI_MEMORY_ERROR_UNKNOWN                0x02
#define EFI_MEMORY_ERROR_DEVICE                 0x03
#define EFI_MEMORY_ERROR_PARTITION              0x04


//*************************************************************
// EFI_MEMORY_ERROR_OPERATION
//*************************************************************
typedef UINT8 EFI_MEMORY_ERROR_OPERATION;

//
// Memory Error Operations
//
#define EFI_MEMORY_OPERATION_OTHER              0x01
#define EFI_MEMORY_OPERATION_UNKNOWN            0x02
#define EFI_MEMORY_OPERATION_READ               0x03
#define EFI_MEMORY_OPERATION_WRITE              0x04
#define EFI_MEMORY_OPERATION_PARTIAL_WRITE      0x05
```

EFI_STATUS_CODE_DIMM_NUMBER

Summary

This structure defines extended data describing a DIMM.

Prototype

```
typedef struct {
  EFI_STATUS_CODE_DATA                    DataHeader;
  UINT16                                  Array;
  UINT16                                  Device;
} EFI_STATUS_CODE_DIMM_NUMBER;
```

Parameters

DataHeader

The data header identifying the data. *DataHeader.HeaderSize* should be **sizeof (EFI_STATUS_CODE_DATA)**, *DataHeader.Size* should be **sizeof (EFI_STATUS_CODE_DIMM_NUMBER) -** *HeaderSize*, and *DataHeader.Type* should be **EFI_STATUS_CODE_SPECIFIC_DATA_GUID**.

Array

The memory array number.

Device

The device number within that *Array*.

Description

This extended data provides some context that consumers can use to locate a DIMM within the overall memory scheme. The *Array* and *Device* numbers may indicate a specific DIMM, or they may be populated with the group definitions in "Related Definitions" below.

Related Definitions

```
//
// Definitions to describe Group Operations
// Many memory init operations are essentially group
// operations.
//
#define  EFI_MULTIPLE_MEMORY_DEVICE_OPERATION      0xfffe
#define  EFI_ALL_MEMORY_DEVICE_OPERATION           0xffff
#define  EFI_MULTIPLE_MEMORY_ARRAY_OPERATION       0xfffe
#define  EFI_ALL_MEMORY_ARRAY_OPERATION            0xffff
```

Following is a description of the fields in the above definition:

EFI_MULTIPLE_MEMORY_DEVICE_OPERATION	A definition to describe that the operation is performed on multiple devices within the array.
EFI_ALL_MEMORY_DEVICE_OPERATION	A definition to describe that the operation is performed on all devices within the array.
EFI_MULTIPLE_MEMORY_ARRAY_OPERATION	A definition to describe that the operation is performed on multiple arrays.
EFI_ALL_MEMORY_ARRAY_OPERATION	A definition to describe that the operation is performed on all the arrays

EFI_MEMORY_MODULE_MISMATCH_ERROR_DATA

Summary

This structure defines extended data describing memory modules that do not match.

Prototype

```
typedef struct {
  EFI_STATUS_CODE_DATA                  DataHeader;
  EFI_STATUS_CODE_DIMM_NUMBER           Instance;
} EFI_MEMORY_MODULE_MISMATCH_ERROR_DATA;
```

Parameters

DataHeader

The data header identifying the data. *DataHeader.HeaderSize* should be **sizeof (EFI_STATUS_CODE_DATA)**, *DataHeader.Size* should be **sizeof (EFI_MEMORY_MODULE_MISMATCH_ERROR_DATA) -** *HeaderSize*, and *DataHeader.Type* should be **EFI_STATUS_CODE_SPECIFIC_DATA_GUID**.

Instance

The instance number of the memory module that does not match. See the definition for type **EFI_STATUS_CODE_DIMM_NUMBER**.

Description

This extended data may be used to convey the specifics of memory modules that do not match.

EFI_MEMORY_RANGE_EXTENDED_DATA

Summary

This structure defines extended data describing a memory range.

Prototype

```
typedef struct {
  EFI_STATUS_CODE_DATA                DataHeader;
  EFI_PHYSICAL_ADDRESS                Start;
  EFI_PHYSICAL_ADDRESS                Length;
} EFI_MEMORY_RANGE_EXTENDED_DATA;
```

Parameters

DataHeader

The data header identifying the data. *DataHeader.HeaderSize* should be **sizeof (EFI_STATUS_CODE_DATA)**, *DataHeader.Size* should be **sizeof (EFI_MEMORY_RANGE_EXTENDED_DATA) -** *HeaderSize*, and *DataHeader.Type* should be **EFI_STATUS_CODE_SPECIFIC_DATA_GUID**.

Start

The starting address of the memory range. Type **EFI_PHYSICAL_ADDRESS** is defined in **AllocatePages()** in the *EFI 1.10 Specification.*

Length

The length in bytes of the memory range.

Description

This extended data may be used to convey the specifics of a memory range. Ranges are specified with a start address and a length.

User-Accessible Peripherals Class

EFI_PERIPHERAL Class

The table below lists the subclasses defined in the User-Accessible Peripheral class. See Subclass Definitions in for their code definitions.

Table 4-5. Defined Subclasses: User-Accessible Peripheral Class

Subclass	Code Name
Unspecified	EFI_PERIPHERAL_UNSPECIFIED
Keyboard	EFI_PERIPHERAL_KEYBOARD
Mouse	EFI_PERIPHERAL_MOUSE
Local console	EFI_PERIPHERAL_LOCAL_CONSOLE
Remote console	EFI_PERIPHERAL_REMOTE_CONSOLE
Serial port	EFI_PERIPHERAL_SERIAL_PORT
Parallel port	EFI_PERIPHERAL_PARALLEL_PORT
Fixed media	EFI_PERIPHERAL_FIXED_MEDIA
Removable media	EFI_PERIPHERAL_REMOVABLE_MEDIA
Audio input	EFI_PERIPHERAL_AUDIO_INPUT
Audio output	EFI_PERIPHERAL_AUDIO_OUTPUT
LCD device	EFI_PERIPHERAL_LCD_DEVICE
Network device	EFI_PERIPHERAL_NETWORK
0x0D–0x7F	Reserved for future use by this specification.
0x80–0xFF	Reserved for OEM use.

Subclass Definitions

Summary

Definitions for the User-Accessible Peripheral subclasses. See Subclasses in Status Code Classes: User-Accessible Peripheral Class for descriptions of these subclasses.

Prototype

```
//
// Peripheral Subclass definitions.
// Values of 12-127 are reserved for future use by this
// specification.
// Values of 128-255 are reserved for OEM use.
//
#define EFI_PERIPHERAL_UNSPECIFIED     (EFI_PERIPHERAL | 0x00000000)
#define EFI_PERIPHERAL_KEYBOARD        (EFI_PERIPHERAL | 0x00010000)
#define EFI_PERIPHERAL_MOUSE           (EFI_PERIPHERAL | 0x00020000)
#define EFI_PERIPHERAL_LOCAL_CONSOLE   (EFI_PERIPHERAL | 0x00030000)
#define EFI_PERIPHERAL_REMOTE_CONSOLE  (EFI_PERIPHERAL | 0x00040000)
#define EFI_PERIPHERAL_SERIAL_PORT     (EFI_PERIPHERAL | 0x00050000)
#define EFI_PERIPHERAL_PARALLEL_PORT   (EFI_PERIPHERAL | 0x00060000)
#define EFI_PERIPHERAL_FIXED_MEDIA     (EFI_PERIPHERAL | 0x00070000)
#define EFI_PERIPHERAL_REMOVABLE_MEDIA (EFI_PERIPHERAL | 0x00080000)
#define EFI_PERIPHERAL_AUDIO_INPUT     (EFI_PERIPHERAL | 0x00090000)
#define EFI_PERIPHERAL_AUDIO_OUTPUT    (EFI_PERIPHERAL | 0x000A0000)
#define EFI_PERIPHERAL_LCD_DEVICE      (EFI_PERIPHERAL | 0x000B0000)
#define EFI_PERIPHERAL_NETWORK         (EFI_PERIPHERAL | 0x000C0000)
```

Progress Code Definitions

Summary

Progress code definitions for the User-Accessible Peripheral class and all subclasses. See Progress Code Operations in Status Code Classes: User-Accessible Peripheral Class for descriptions of these progress codes.

The following subclasses define additional subclass-specific progress code operations, which are included below:

- Keyboard
- Mouse
- Serial port

Prototype

```
//
// Peripheral Class Progress Code definitions.
// These are shared by all subclasses.
//
#define EFI_P_PC_INIT                   0x00000000
#define EFI_P_PC_RESET                  0x00000001
#define EFI_P_PC_DISABLE                0x00000002
#define EFI_P_PC_PRESENCE_DETECT        0x00000003
#define EFI_P_PC_ENABLE                 0x00000004
#define EFI_P_PC_RECONFIG               0x00000005
#define EFI_P_PC_DETECTED               0x00000006


//
// Peripheral Class Unspecified Subclass Progress Code definitions.
//


//
// Peripheral Class Keyboard Subclass Progress Code definitions.
//
#define EFI_P_KEYBOARD_PC_CLEAR_BUFFER  (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_P_KEYBOARD_PC_SELF_TEST     (EFI_SUBCLASS_SPECIFIC | 0x00000001)


//
// Peripheral Class Mouse Subclass Progress Code definitions.
//
#define EFI_P_MOUSE_PC_SELF_TEST        (EFI_SUBCLASS_SPECIFIC | 0x00000000)


//
// Peripheral Class Local Console Subclass Progress Code definitions.
//


//
// Peripheral Class Remote Console Subclass Progress Code definitions.
//


//
// Peripheral Class Serial Port Subclass Progress Code definitions.
//
#define EFI_P_SERIAL_PORT_PC_CLEAR_BUFFER
                                        (EFI_SUBCLASS_SPECIFIC | 0x00000000)


//
// Peripheral Class Parallel Port Subclass Progress Code definitions.
//


//
// Peripheral Class Fixed Media Subclass Progress Code definitions.
//
```

```
//
// Peripheral Class Removable Media Subclass Progress Code definitions.
//


//
// Peripheral Class Audio Input Subclass Progress Code definitions.
//


//
// Peripheral Class Audio Output Subclass Progress Code definitions.
//


//
// Peripheral Class LCD Device Subclass Progress Code definitions.
//


//
// Peripheral Class Network Subclass Progress Code definitions.
//
```

Error Code Definitions

Summary

Error code definitions for the User-Accessible Peripheral class and all subclasses. See Error Code Operations in Status Code Classes: User-Accessible Peripheral Class for descriptions of these error codes.

The following subclasses define additional subclass-specific error code operations, which are included below:

- Keyboard
- Mouse

Prototype

```
//
// Peripheral Class Error Code definitions.
// These are shared by all subclasses.
//
#define EFI_P_EC_NON_SPECIFIC           0x00000000
#define EFI_P_EC_DISABLED               0x00000001
#define EFI_P_EC_NOT_SUPPORTED          0x00000002
#define EFI_P_EC_NOT_DETECTED           0x00000003
#define EFI_P_EC_NOT_CONFIGURED         0x00000004
#define EFI_P_EC_INTERFACE_ERROR        0x00000005
#define EFI_P_EC_CONTROLLER_ERROR       0x00000006
#define EFI_P_EC_INPUT_ERROR            0x00000007
#define EFI_P_EC_OUTPUT_ERROR           0x00000008
#define EFI_P_EC_RESOURCE_CONFLICT      0x00000009


//
// Peripheral Class Unspecified Subclass Error Code definitions.
//


//
// Peripheral Class Keyboard Subclass Error Code definitions.
//
#define EFI_P_KEYBOARD_EC_LOCKED        (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_P_KEYBOARD_EC_STUCK_KEY     (EFI_SUBCLASS_SPECIFIC | 0x00000001)


//
// Peripheral Class Mouse Subclass Error Code definitions.
//
#define EFI_P_MOUSE_EC_LOCKED           (EFI_SUBCLASS_SPECIFIC | 0x00000000)


//
// Peripheral Class Local Console Subclass Error Code definitions.
//


//
// Peripheral Class Remote Console Subclass Error Code definitions.
//


//
// Peripheral Class Serial Port Subclass Error Code definitions.
//


//
// Peripheral Class Parallel Port Subclass Error Code definitions.
//


//
// Peripheral Class Fixed Media Subclass Error Code definitions.
//
```

```
//
// Peripheral Class Removable Media Subclass Error Code definitions.
//


//
// Peripheral Class Audio Input Subclass Error Code definitions.
//


//
// Peripheral Class Audio Output Subclass Error Code definitions.
//


//
// Peripheral Class LCD Device Subclass Error Code definitions.
//


//
// Peripheral Class Network Subclass Error Code definitions.
//
```

Extended Error Data

The User-Accessible Peripheral class uses the following extended error data definitions:

- **EFI_DEVICE_PATH_EXTENDED_DATA**
- **EFI_RESOURCE_ALLOC_FAILURE_ERROR_DATA**

See Common Status Code Definitions: Extended Error Data for definitions.

I/O Bus Class

EFI_IO_BUS Class

The table below lists the subclasses defined in the I/O Bus class. See Subclass Definitions for their code definitions.

Table 4-6. Defined Subclasses: I/O Bus Class

Subclass	Code Name
Unspecified	EFI_IO_BUS_UNSPECIFIED
PCI	EFI_IO_BUS_PCI
USB	EFI_IO_BUS_USB
InfiniBand* architecture	EFI_IO_BUS_IBA
AGP	EFI_IO_BUS_AGP
PC card	EFI_IO_BUS_PC_CARD
Low pin count (LPC)	EFI_IO_BUS_LPC
SCSI	EFI_IO_BUS_SCSI
ATA/ATAPI/SATA	EFI_IO_BUS_ATA_ATAPI
Fibre Channel	EFI_IO_BUS_FC
IP network	EFI_IO_BUS_IP_NETWORK
SMBus	EFI_IO_BUS_SMBUS
I2C	EFI_IO_BUS_I2C
0x0D–0x7F	Reserved for future use by this specification.
0x80–0xFF	Reserved for OEM use.

Subclass Definitions

Summary

Definitions for the I/O Bus subclasses. See Subclasses in Status Code Classes: I/O Bus Class for descriptions of these subclasses.

Prototype

```
//
// IO Bus Subclass definitions.
// Values of 14-127 are reserved for future use by this
// specification.
// Values of 128-255 are reserved for OEM use.
//
#define EFI_IO_BUS_UNSPECIFIED                  (EFI_IO_BUS | 0x00000000)
#define EFI_IO_BUS_PCI                          (EFI_IO_BUS | 0x00010000)
#define EFI_IO_BUS_USB                          (EFI_IO_BUS | 0x00020000)
#define EFI_IO_BUS_IBA                          (EFI_IO_BUS | 0x00030000)
#define EFI_IO_BUS_AGP                          (EFI_IO_BUS | 0x00040000)
#define EFI_IO_BUS_PC_CARD                      (EFI_IO_BUS | 0x00050000)
#define EFI_IO_BUS_LPC                          (EFI_IO_BUS | 0x00060000)
#define EFI_IO_BUS_SCSI                         (EFI_IO_BUS | 0x00070000)
#define EFI_IO_BUS_ATA_ATAPI                    (EFI_IO_BUS | 0x00080000)
#define EFI_IO_BUS_FC                           (EFI_IO_BUS | 0x00090000)
#define EFI_IO_BUS_IP_NETWORK                   (EFI_IO_BUS | 0x000A0000)
#define EFI_IO_BUS_SMBUS                        (EFI_IO_BUS | 0x000B0000)
#define EFI_IO_BUS_I2C                          (EFI_IO_BUS | 0x000C0000)
```

Progress Code Definitions

Summary

Progress code definitions for the I/O Bus class and all subclasses. See Progress Code Operations in Status Code Classes: I/O Bus Class for descriptions of these progress codes.

The following subclasses define additional subclass-specific progress code operations, which are included below:

- PCI

Prototype

```
//
// IO Bus Class Progress Code definitions.
// These are shared by all subclasses.
//
#define EFI_IOB_PC_INIT                 0x00000000
#define EFI_IOB_PC_RESET                0x00000001
#define EFI_IOB_PC_DISABLE              0x00000002
#define EFI_IOB_PC_DETECT               0x00000003
#define EFI_IOB_PC_ENABLE               0x00000004
#define EFI_IOB_PC_RECONFIG             0x00000005
#define EFI_IOB_PC_HOTPLUG              0x00000006


//
// IO Bus Class Unspecified Subclass Progress Code definitions.
//


//
// IO Bus Class PCI Subclass Progress Code definitions.
//
#define EFI_IOB_PCI_PC_BUS_ENUM         (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_IOB_PCI_PC_RES_ALLOC        (EFI_SUBCLASS_SPECIFIC | 0x00000001)
#define EFI_IOB_PCI_PC_HPC_INIT         (EFI_SUBCLASS_SPECIFIC | 0x00000002)


//
// IO Bus Class USB Subclass Progress Code definitions.
//


//
// IO Bus Class IBA Subclass Progress Code definitions.
//


//
// IO Bus Class AGP Subclass Progress Code definitions.
//


//
// IO Bus Class PC Card Subclass Progress Code definitions.
//


//
// IO Bus Class LPC Subclass Progress Code definitions.
//


//
// IO Bus Class SCSI Subclass Progress Code definitions.
//


//
// IO Bus Class ATA/ATAPI Subclass Progress Code definitions.
```

```
//


//
// IO Bus Class FC Subclass Progress Code definitions.
//


//
// IO Bus Class IP Network Subclass Progress Code definitions.
//


//
// IO Bus Class SMBUS Subclass Progress Code definitions.
//


//
// IO Bus Class I2C Subclass Progress Code definitions.
//
```

Error Code Definitions

Summary

Error code definitions for the I/O Bus class and all subclasses. See Error Code Operations in Status Code Classes: I/O Bus Class for descriptions of these error codes.

The following subclasses define additional subclass-specific error code operations, which are included below:

- PCI

Prototype

```
// IO Bus Class Error Code definitions.
// These are shared by all subclasses.
//
#define EFI_IOB_EC_NON_SPECIFIC        0x00000000
#define EFI_IOB_EC_DISABLED            0x00000001
#define EFI_IOB_EC_NOT_SUPPORTED       0x00000002
#define EFI_IOB_EC_NOT_DETECTED        0x00000003
#define EFI_IOB_EC_NOT_CONFIGURED      0x00000004
#define EFI_IOB_EC_INTERFACE_ERROR     0x00000005
#define EFI_IOB_EC_CONTROLLER_ERROR    0x00000006
#define EFI_IOB_EC_READ_ERROR          0x00000007
#define EFI_IOB_EC_WRITE_ERROR         0x00000008
#define EFI_IOB_EC_RESOURCE_CONFLICT   0x00000009


//
// IO Bus Class Unspecified Subclass Error Code definitions.
//


//
// IO Bus Class PCI Subclass Error Code definitions.
//
#define EFI_IOB_PCI_EC_PERR            (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_IOB_PCI_EC_SERR            (EFI_SUBCLASS_SPECIFIC | 0x00000001)


//
// IO Bus Class USB Subclass Error Code definitions.
//
```

```
//
// IO Bus Class IBA Subclass Error Code definitions.
//


//
// IO Bus Class AGP Subclass Error Code definitions.
//


//
// IO Bus Class PC Card Subclass Error Code definitions.
//


//
// IO Bus Class LPC Subclass Error Code definitions.
//


//
// IO Bus Class SCSI Subclass Error Code definitions.
//


//
// IO Bus Class ATA/ATAPI Subclass Error Code definitions.
//


//
// IO Bus Class FC Subclass Error Code definitions.
//


//
// IO Bus Class IP Network Subclass Error Code definitions.
//


//
// IO Bus Class SMBUS Subclass Error Code definitions.
//


//
// IO Bus Class I2C Subclass Error Code definitions.
//
```

Extended Error Data

The I/O Bus class uses the following extended error data definitions:

- **EFI_DEVICE_PATH_EXTENDED_DATA**
- **EFI_DEVICE_HANDLE_EXTENDED_DATA**
- **EFI_RESOURCE_ALLOC_FAILURE_ERROR_DATA**

See Common Status Code Definitions: Extended Error Data for definitions.

Software Classes

Host Software Class

EFI_SOFTWARE Class

The table below lists the subclasses defined in the Host Software class. See Subclass Definitions for their code definitions.

Table 4-7. Defined Subclasses: Host Software Class

Subclass	Code Name
Unspecified	EFI_SOFTWARE_UNSPECIFIED
Security (SEC)	EFI_SOFTWARE_SEC
PEI Foundation	EFI_SOFTWARE_PEI_CORE
PEI module	EFI_SOFTWARE_PEI_MODULE
DXE Foundation	EFI_SOFTWARE_DXE_CORE
DXE Boot Service driver	EFI_SOFTWARE_DXE_BS_DRIVER
DXE Runtime Service driver	EFI_SOFTWARE_DXE_RT_DRIVER
SMM driver	EFI_SOFTWARE_SMM_DRIVER
EFI application	EFI_SOFTWARE_EFI_APPLICATION
OS loader	EFI_SOFTWARE_EFI_OS_LOADER
Runtime (RT)	EFI_SOFTWARE_EFI_RT
Afterlife (AL)	EFI_SOFTWARE_EFI_AL
EBC exception	EFI_SOFTWARE_EBC_EXCEPTION
IA-32 exception	EFI_SOFTWARE_IA32_EXCEPTION
Itanium® processor family exception	EFI_SOFTWARE_IPF_EXCEPTION
PEI Services	EFI_SOFTWARE_PEI_SERVICE
EFI Boot Service	EFI_SOFTWARE_EFI_BOOT_SERVICE
EFI Runtime Service	EFI_SOFTWARE_EFI_RUNTIME_SERVICE
DXE Service	EFI_SOFTWARE_EFI_DXE_SERVICE
0x13–0x7F	Reserved for future use by this specification.
0x80–0xFF	Reserved for OEM use.

Subclass Definitions

Summary

Definitions for the Host Software subclasses. See Subclasses in Status Code Classes: Host Software Class for descriptions of these subclasses.

Prototype

```
//
// Software Subclass definitions.
// Values of 14-127 are reserved for future use by this
// specification.
// Values of 128-255 are reserved for OEM use.
//
#define EFI_SOFTWARE_UNSPECIFIED                (EFI_SOFTWARE | 0x00000000)
#define EFI_SOFTWARE_SEC                        (EFI_SOFTWARE | 0x00010000)
#define EFI_SOFTWARE_PEI_CORE                   (EFI_SOFTWARE | 0x00020000)
#define EFI_SOFTWARE_PEI_MODULE                 (EFI_SOFTWARE | 0x00030000)
#define EFI_SOFTWARE_DXE_CORE                   (EFI_SOFTWARE | 0x00040000)
#define EFI_SOFTWARE_DXE_BS_DRIVER              (EFI_SOFTWARE | 0x00050000)
#define EFI_SOFTWARE_DXE_RT_DRIVER              (EFI_SOFTWARE | 0x00060000)
#define EFI_SOFTWARE_SMM_DRIVER                 (EFI_SOFTWARE | 0x00070000)
#define EFI_SOFTWARE_EFI_APPLICATION            (EFI_SOFTWARE | 0x00080000)
#define EFI_SOFTWARE_EFI_OS_LOADER              (EFI_SOFTWARE | 0x00090000)
#define EFI_SOFTWARE_RT                         (EFI_SOFTWARE | 0x000A0000)
#define EFI_SOFTWARE_AL                         (EFI_SOFTWARE | 0x000B0000)
#define EFI_SOFTWARE_EBC_EXCEPTION              (EFI_SOFTWARE | 0x000C0000)
#define EFI_SOFTWARE_IA32_EXCEPTION             (EFI_SOFTWARE | 0x000D0000)
#define EFI_SOFTWARE_IPF_EXCEPTION              (EFI_SOFTWARE | 0x000E0000)
#define EFI_SOFTWARE_PEI_SERVICE                (EFI_SOFTWARE | 0x000F0000
#define EFI_SOFTWARE_EFI_BOOT_SERVICE           (EFI_SOFTWARE | 0x00100000)
#define EFI_SOFTWARE_EFI_RUNTIME_SERVICE        (EFI_SOFTWARE | 0x00110000)
#define EFI_SOFTWARE_EFI_DXE_SERVICE            (EFI_SOFTWARE | 0x00120000)
```

Progress Code Definitions

Summary

Progress code definitions for the Host Software class and all subclasses. See Progress Code Operations in Status Code Classes: Host Software Class for descriptions of these progress codes.

The following subclasses define additional subclass-specific progress code operations, which are included below:

- SEC
- PEI Foundation
- PEI Module
- DXE Foundation
- DXE Boot Service Driver
- Runtime (RT)
- Afterlife (AL)
- PEI Services

- Boot Services
- Runtime Services
- DXE Services

Prototype

```
//
// Software Class Progress Code definitions.
// These are shared by all subclasses.
//
#define EFI_SW_PC_INIT                    0x00000000
#define EFI_SW_PC_LOAD                    0x00000001
#define EFI_SW_PC_INIT_BEGIN              0x00000002
#define EFI_SW_PC_INIT_END                0x00000003
#define EFI_SW_PC_AUTHENTICATE_BEGIN      0x00000004
#define EFI_SW_PC_AUTHENTICATE_END        0x00000005
#define EFI_SW_PC_INPUT_WAIT              0x00000006
#define EFI_SW_PC_USER_SETUP              0x00000007


//
// Software Class Unspecified Subclass Progress Code definitions.
//


//
// Software Class SEC Subclass Progress Code definitions.
//
#define EFI_SW_SEC_PC_ENTRY_POINT         (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_SW_SEC_PC_HANDOFF_TO_NEXT     (EFI_SUBCLASS_SPECIFIC | 0x00000001)


//
// Software Class PEI Foundation Subclass Progress Code definitions.
//
#define EFI_SW_PEI_CORE_PC_ENTRY_POINT    (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_SW_PEI_CORE_PC_HANDOFF_TO_NEXT
                                          (EFI_SUBCLASS_SPECIFIC | 0x00000001)
#define EFI_SW_PEI_CORE_PC_RETURN_TO_LAST (EFI_SUBCLASS_SPECIFIC | 0x00000002)


//
// Software Class PEI Module Subclass Progress Code definitions.
//
#define EFI_SW_PEIM_PC_RECOVERY_BEGIN     (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_SW_PEIM_PC_CAPSULE_LOAD       (EFI_SUBCLASS_SPECIFIC | 0x00000001)
#define EFI_SW_PEIM_PC_CAPSULE_START      (EFI_SUBCLASS_SPECIFIC | 0x00000001)
#define EFI_SW_PEIM_PC_RECOVERY_USER      (EFI_SUBCLASS_SPECIFIC | 0x00000003)
#define EFI_SW_PEIM_PC_RECOVERY_AUTO      (EFI_SUBCLASS_SPECIFIC | 0x00000004)


//
// Software Class DXE Foundation Subclass Progress Code definitions.
//
#define EFI_SW_DXE_CORE_PC_ENTRY_POINT    (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_SW_DXE_CORE_PC_HANDOFF_TO_NEXT
                                          (EFI_SUBCLASS_SPECIFIC | 0x00000001)
```

```
#define EFI_SW_DXE_CORE_PC_RETURN_TO_LAST (EFI_SUBCLASS_SPECIFIC | 0x00000002)
#define EFI_SW_DXE_CORE_PC_START_DRIVER   (EFI_SUBCLASS_SPECIFIC | 0x00000003)


//
// Software Class DXE BS Driver Subclass Progress Code definitions.
//
#define EFI_SW_DXE_BS_PC_LEGACY_OPROM_INIT
                                          (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_SW_DXE_BS_PC_READY_TO_BOOT_EVENT
                                          (EFI_SUBCLASS_SPECIFIC | 0x00000001)
#define EFI_SW_DXE_BS_PC_LEGACY_BOOT_EVENT
                                          (EFI_SUBCLASS_SPECIFIC | 0x00000002)
#define EFI_SW_DXE_BS_PC_EXIT_BOOT_SERVICES_EVENT
                                          (EFI_SUBCLASS_SPECIFIC | 0x00000003)
#define EFI_SW_DXE_BS_PC_VIRTUAL_ADDRESS_CHANGE_EVENT
                                          (EFI_SUBCLASS_SPECIFIC | 0x00000004)


//
// Software Class DXE RT Driver Subclass Progress Code definitions.
//


//
// Software Class SMM Driver Subclass Progress Code definitions.
//


//
// Software Class EFI Application Subclass Progress Code definitions.
//


//
// Software Class EFI OS Loader Subclass Progress Code definitions.
//


//
// Software Class EFI RT Subclass Progress Code definitions.
//
#define EFI_SW_RT_PC_ENTRY_POINT          (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_SW_RT_PC_HANDOFF_TO_NEXT      (EFI_SUBCLASS_SPECIFIC | 0x00000001)
#define EFI_SW_RT_PC_RETURN_TO_LAST       (EFI_SUBCLASS_SPECIFIC | 0x00000002)


//
// Software Class EFI AL Subclass Progress Code definitions.
//
#define EFI_SW_AL_PC_ENTRY_POINT          (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_SW_AL_PC_RETURN_TO_LAST       (EFI_SUBCLASS_SPECIFIC | 0x00000001)


//
// Software Class EBC Exception Subclass Progress Code definitions.
//


//
```

```
// Software Class IA32 Exception Subclass Progress Code definitions.
//


//
// Software Class IPF Exception Subclass Progress Code definitions.
//


//
// Software Class PEI Services Subclass Progress Code definitions.
//
#define EFI_SW_PS_PC_INSTALL_PPI           (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_SW_PS_PC_REINSTALL_PPI         (EFI_SUBCLASS_SPECIFIC | 0x00000001)
#define EFI_SW_PS_PC_LOCATE_PPI            (EFI_SUBCLASS_SPECIFIC | 0x00000002)
#define EFI_SW_PS_PC_NOTIFY_PPI            (EFI_SUBCLASS_SPECIFIC | 0x00000003)
#define EFI_SW_PS_PC_GET_BOOT_MODE         (EFI_SUBCLASS_SPECIFIC | 0x00000004)
#define EFI_SW_PS_PC_SET_BOOT_MODE         (EFI_SUBCLASS_SPECIFIC | 0x00000005)
#define EFI_SW_PS_PC_GET_HOB_LIST          (EFI_SUBCLASS_SPECIFIC | 0x00000006)
#define EFI_SW_PS_PC_CREATE_HOB            (EFI_SUBCLASS_SPECIFIC | 0x00000007)
#define EFI_SW_PS_PC_FFS_FIND_NEXT_VOLUME  (EFI_SUBCLASS_SPECIFIC | 0x00000008)
#define EFI_SW_PS_PC_FFS_FIND_NEXT_FILE    (EFI_SUBCLASS_SPECIFIC | 0x00000009)
#define EFI_SW_PS_PC_FFS_FIND_SECTION_DATA
                                           (EFI_SUBCLASS_SPECIFIC | 0x0000000A)
#define EFI_SW_PS_PC_INSTALL_PEI_MEMORY    (EFI_SUBCLASS_SPECIFIC | 0x0000000B)
#define EFI_SW_PS_PC_ALLOCATE_PAGES        (EFI_SUBCLASS_SPECIFIC | 0x0000000C)
#define EFI_SW_PS_PC_ALLOCATE_POOL         (EFI_SUBCLASS_SPECIFIC | 0x0000000D)
#define EFI_SW_PS_PC_COPY_MEM              (EFI_SUBCLASS_SPECIFIC | 0x0000000E)
#define EFI_SW_PS_PC_SET_MEM               (EFI_SUBCLASS_SPECIFIC | 0x0000000F)


//
// Software Class EFI Boot Services Subclass Progress Code definitions.
//
#define EFI_SW_BS_PC_RAISE_TPL             (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_SW_BS_PC_RESTORE_TPL           (EFI_SUBCLASS_SPECIFIC | 0x00000001)
#define EFI_SW_BS_PC_ALLOCATE_PAGES        (EFI_SUBCLASS_SPECIFIC | 0x00000002)
#define EFI_SW_BS_PC_FREE_PAGES            (EFI_SUBCLASS_SPECIFIC | 0x00000003)
#define EFI_SW_BS_PC_GET_MEMORY_MAP        (EFI_SUBCLASS_SPECIFIC | 0x00000004)
#define EFI_SW_BS_PC_ALLOCATE_POOL         (EFI_SUBCLASS_SPECIFIC | 0x00000005)
#define EFI_SW_BS_PC_FREE_POOL             (EFI_SUBCLASS_SPECIFIC | 0x00000006)
#define EFI_SW_BS_PC_CREATE_EVENT          (EFI_SUBCLASS_SPECIFIC | 0x00000007)
#define EFI_SW_BS_PC_SET_TIMER             (EFI_SUBCLASS_SPECIFIC | 0x00000008)
#define EFI_SW_BS_PC_WAIT_FOR_EVENT        (EFI_SUBCLASS_SPECIFIC | 0x00000009)
#define EFI_SW_BS_PC_SIGNAL_EVENT          (EFI_SUBCLASS_SPECIFIC | 0x0000000A)
#define EFI_SW_BS_PC_CLOSE_EVENT           (EFI_SUBCLASS_SPECIFIC | 0x0000000B)
#define EFI_SW_BS_PC_CHECK_EVENT           (EFI_SUBCLASS_SPECIFIC | 0x0000000C)
#define EFI_SW_BS_PC_INSTALL_PROTOCOL_INTERFACE
                                           (EFI_SUBCLASS_SPECIFIC | 0x0000000D)
#define EFI_SW_BS_PC_REINSTALL_PROTOCOL_INTERFACE
                                           (EFI_SUBCLASS_SPECIFIC | 0x0000000E)
#define EFI_SW_BS_PC_UNINSTALL_PROTOCOL_INTERFACE
                                           (EFI_SUBCLASS_SPECIFIC | 0x0000000F)
#define EFI_SW_BS_PC_HANDLE_PROTOCOL       (EFI_SUBCLASS_SPECIFIC | 0x00000010)
#define EFI_SW_BS_PC_PC_HANDLE_PROTOCOL    (EFI_SUBCLASS_SPECIFIC | 0x00000011)
#define EFI_SW_BS_PC_REGISTER_PROTOCOL_NOTIFY
                                           (EFI_SUBCLASS_SPECIFIC | 0x00000012)
#define EFI_SW_BS_PC_LOCATE_HANDLE         (EFI_SUBCLASS_SPECIFIC | 0x00000013)
#define EFI_SW_BS_PC_INSTALL_CONFIGURATION_TABLE
                                           (EFI_SUBCLASS_SPECIFIC | 0x00000014)
```

```
#define EFI_SW_BS_PC_LOAD_IMAGE             (EFI_SUBCLASS_SPECIFIC | 0x00000015)
#define EFI_SW_BS_PC_START_IMAGE            (EFI_SUBCLASS_SPECIFIC | 0x00000016)
#define EFI_SW_BS_PC_EXIT                   (EFI_SUBCLASS_SPECIFIC | 0x00000017)
#define EFI_SW_BS_PC_UNLOAD_IMAGE           (EFI_SUBCLASS_SPECIFIC | 0x00000018)
#define EFI_SW_BS_PC_EXIT_BOOT_SERVICES     (EFI_SUBCLASS_SPECIFIC | 0x00000019)
#define EFI_SW_BS_PC_GET_NEXT_MONOTONIC_COUNT
                                            (EFI_SUBCLASS_SPECIFIC | 0x0000001A)
#define EFI_SW_BS_PC_STALL                  (EFI_SUBCLASS_SPECIFIC | 0x0000001B)
#define EFI_SW_BS_PC_SET_WATCHDOG_TIMER     (EFI_SUBCLASS_SPECIFIC | 0x0000001C)
#define EFI_SW_BS_PC_CONNECT_CONTROLLER     (EFI_SUBCLASS_SPECIFIC | 0x0000001D)
#define EFI_SW_BS_PC_DISCONNECT_CONTROLLER
                                            (EFI_SUBCLASS_SPECIFIC | 0x0000001E)
#define EFI_SW_BS_PC_OPEN_PROTOCOL          (EFI_SUBCLASS_SPECIFIC | 0x0000001F)
#define EFI_SW_BS_PC_CLOSE_PROTOCOL         (EFI_SUBCLASS_SPECIFIC | 0x00000020)
#define EFI_SW_BS_PC_OPEN_PROTOCOL_INFORMATION
                                            (EFI_SUBCLASS_SPECIFIC | 0x00000021)
#define EFI_SW_BS_PC_PROTOCOLS_PER_HANDLE   (EFI_SUBCLASS_SPECIFIC | 0x00000022)
#define EFI_SW_BS_PC_LOCATE_HANDLE_BUFFER   (EFI_SUBCLASS_SPECIFIC | 0x00000023)
#define EFI_SW_BS_PC_LOCATE_PROTOCOL        (EFI_SUBCLASS_SPECIFIC | 0x00000024)
#define EFI_SW_BS_PC_INSTALL_MULTIPLE_INTERFACES
                                            (EFI_SUBCLASS_SPECIFIC | 0x00000025)
#define EFI_SW_BS_PC_UNINSTALL_MULTIPLE_INTERFACES
                                            (EFI_SUBCLASS_SPECIFIC | 0x00000026)
#define EFI_SW_BS_PC_CALCULATE_CRC_32       (EFI_SUBCLASS_SPECIFIC | 0x00000027)
#define EFI_SW_BS_PC_COPY_MEM               (EFI_SUBCLASS_SPECIFIC | 0x00000028)
#define EFI_SW_BS_PC_SET_MEM                (EFI_SUBCLASS_SPECIFIC | 0x00000029)


//
// Software Class EFI Runtime Services Subclass Progress Code definitions.
//
#define EFI_SW_RS_PC_GET_TIME               (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_SW_RS_PC_SET_TIME               (EFI_SUBCLASS_SPECIFIC | 0x00000001)
#define EFI_SW_RS_PC_GET_WAKEUP_TIME        (EFI_SUBCLASS_SPECIFIC | 0x00000002)
#define EFI_SW_RS_PC_SET_WAKEUP_TIME        (EFI_SUBCLASS_SPECIFIC | 0x00000003)
#define EFI_SW_RS_PC_SET_VIRTUAL_ADDRESS_MAP
                                            (EFI_SUBCLASS_SPECIFIC | 0x00000004)
#define EFI_SW_RS_PC_CONVERT_POINTER        (EFI_SUBCLASS_SPECIFIC | 0x00000005)
#define EFI_SW_RS_PC_GET_VARIABLE           (EFI_SUBCLASS_SPECIFIC | 0x00000006)
#define EFI_SW_RS_PC_GET_NEXT_VARIABLE_NAME
                                            (EFI_SUBCLASS_SPECIFIC | 0x00000007)
#define EFI_SW_RS_PC_SET_VARIABLE           (EFI_SUBCLASS_SPECIFIC | 0x00000008)
#define EFI_SW_RS_PC_GET_NEXT_HIGH_MONOTONIC_COUNT
                                            (EFI_SUBCLASS_SPECIFIC | 0x00000009)
#define EFI_SW_RS_PC_RESET_SYSTEM           (EFI_SUBCLASS_SPECIFIC | 0x0000000A)


//
// Software Class EFI DXE Services Subclass Progress Code definitions
//
#define EFI_SW_DS_PC_ADD_MEMORY_SPACE       (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_SW_DS_PC_ALLOCATE_MEMORY_SPACE
                                            (EFI_SUBCLASS_SPECIFIC | 0x00000001)
#define EFI_SW_DS_PC_FREE_MEMORY_SPACE      (EFI_SUBCLASS_SPECIFIC | 0x00000002)
#define EFI_SW_DS_PC_REMOVE_MEMORY_SPACE    (EFI_SUBCLASS_SPECIFIC | 0x00000003)
#define EFI_SW_DS_PC_GET_MEMORY_SPACE_DESCRIPTOR
                                            (EFI_SUBCLASS_SPECIFIC | 0x00000004)
#define EFI_SW_DS_PC_SET_MEMORY_SPACE_ATTRIBUTES
                                            (EFI_SUBCLASS_SPECIFIC | 0x00000005)
#define EFI_SW_DS_PC_GET_MEMORY_SPACE_MAP   (EFI_SUBCLASS_SPECIFIC | 0x00000006)
```

```
#define EFI_SW_DS_PC_ADD_IO_SPACE          (EFI_SUBCLASS_SPECIFIC | 0x00000007)
#define EFI_SW_DS_PC_ALLOCATE_IO_SPACE     (EFI_SUBCLASS_SPECIFIC | 0x00000008)
#define EFI_SW_DS_PC_FREE_IO_SPACE         (EFI_SUBCLASS_SPECIFIC | 0x00000009)
#define EFI_SW_DS_PC_REMOVE_IO_SPACE       (EFI_SUBCLASS_SPECIFIC | 0x0000000A)
#define EFI_SW_DS_PC_GET_IO_SPACE_DESCRIPTOR
                                           (EFI_SUBCLASS_SPECIFIC | 0x0000000B)
#define EFI_SW_DS_PC_GET_IO_SPACE_MAP      (EFI_SUBCLASS_SPECIFIC | 0x0000000C)
#define EFI_SW_DS_PC_DISPATCH              (EFI_SUBCLASS_SPECIFIC | 0x0000000D)
#define EFI_SW_DS_PC_SCHEDULE              (EFI_SUBCLASS_SPECIFIC | 0x0000000E)
#define EFI_SW_DS_PC_TRUST                 (EFI_SUBCLASS_SPECIFIC | 0x0000000F)
#define EFI_SW_DS_PC_PROCESS_FIRMWARE_VOLUME
                                           (EFI_SUBCLASS_SPECIFIC | 0x00000010)
```

Error Code Definitions

Summary

Error code definitions for the Host Software class and all subclasses. See Error Code Operations in Status Code Classes: Host Software Class for descriptions of these error codes.

The following subclasses define additional subclass-specific error code operations, which are included below:

- PEI Foundation
- PEIM
- DxeBootServiceDriver
- EFI Byte Code (EBC) exception
- IA-32 exception
- Itanium® processor family exception

Prototype

```
//
// Software Class Error Code definitions.
// These are shared by all subclasses.
//
#define EFI_SW_EC_NON_SPECIFIC             0x00000000
#define EFI_SW_EC_LOAD_ERROR               0x00000001
#define EFI_SW_EC_INVALID_PARAMETER        0x00000002
#define EFI_SW_EC_UNSUPPORTED              0x00000003
#define EFI_SW_EC_INVALID_BUFFER           0x00000004
#define EFI_SW_EC_OUT_OF_RESOURCES         0x00000005
#define EFI_SW_EC_ABORTED                  0x00000006
#define EFI_SW_EC_ILLEGAL_SOFTWARE_STATE   0x00000007
#define EFI_SW_EC_ILLEGAL_HARDWARE_STATE   0x00000008
#define EFI_SW_EC_START_ERROR              0x00000009
#define EFI_SW_EC_BAD_DATE_TIME            0x0000000A
#define EFI_SW_EC_CFG_INVALID              0x0000000B
#define EFI_SW_EC_CFG_CLR_REQUEST          0x0000000C
#define EFI_SW_EC_CFG_DEFAULT              0x0000000D
#define EFI_SW_EC_PWD_INVALID              0x0000000E
#define EFI_SW_EC_PWD_CLR_REQUEST          0x0000000F
#define EFI_SW_EC_PWD_CLEARED              0x00000010
#define EFI_SW_EC_EVENT_LOG_FULL           0x00000011


//
// Software Class Unspecified Subclass Error Code definitions.
//


//
// Software Class SEC Subclass Error Code definitions.
//


//
// Software Class PEI Foundation Subclass Error Code definitions.
//
#define EFI_SW_PEI_CORE_EC_DXE_CORRUPT     (EFI_SUBCLASS_SPECIFIC | 0x00000000)


//
// Software Class PEI Module Subclass Error Code definitions.
//
#define EFI_SW_PEIM_EC_NO_RECOVERY_CAPSULE
                                           (EFI_SUBCLASS_SPECIFIC | 0x00000000)
#define EFI_SW_PEIM_EC_INVALID_CAPSULE_DESCRIPTOR
                                           (EFI_SUBCLASS_SPECIFIC | 0x00000001)


//
// Software Class DXE Foundation Subclass Error Code definitions.
//


//
// Software Class DXE Boot Service Driver Subclass Error Code definitions.
//
```

```
#define EFI_SW_DXE_BS_EC_LEGACY_OPROM_NO_SPACE
                                        (EFI_SUBCLASS_SPECIFIC | 0x00000000)


//
// Software Class DXE Runtime Service Driver Subclass Error Code definitions.
//


//
// Software Class SMM Driver Subclass Error Code definitions.
//


//
// Software Class EFI Application Subclass Error Code definitions.
//


//
// Software Class EFI OS Loader Subclass Error Code definitions.
//


//
// Software Class EFI RT Subclass Error Code definitions.
//


//
// Software Class EFI AL Subclass Error Code definitions.
//


//
// Software Class EBC Exception Subclass Error Code definitions.
// These exceptions are derived from the debug protocol definitions in the EFI
// specification.
//
#define EFI_SW_EC_EBC_UNDEFINED                 0x00000000
#define EFI_SW_EC_EBC_DIVIDE_ERROR              EXCEPT_EBC_DIVIDE_ERROR
#define EFI_SW_EC_EBC_DEBUG                     EXCEPT_EBC_DEBUG
#define EFI_SW_EC_EBC_DEBUG                     EXCEPT_EBC_DEBUG
#define EFI_SW_EC_EBC_BREAKPOINT                EXCEPT_EBC_BREAKPOINT
#define EFI_SW_EC_EBC_OVERFLOW                  EXCEPT_EBC_OVERFLOW
#define EFI_SW_EC_EBC_INVALID_OPCODE            EXCEPT_EBC_INVALID_OPCODE
#define EFI_SW_EC_EBC_STACK_FAULT               EXCEPT_EBC_STACK_FAULT
#define EFI_SW_EC_EBC_ALIGNMENT_CHECK           EXCEPT_EBC_ALIGNMENT_CHECK
#define EFI_SW_EC_EBC_INSTRUCTION_ENCODING      EXCEPT_EBC_INSTRUCTION_ENCODING
#define EFI_SW_EC_EBC_BAD_BREAK                 EXCEPT_EBC_BAD_BREAK
#define EFI_SW_EC_EBC_STEP                      EXCEPT_EBC_STEP


//
// Software Class IA32 Exception Subclass Error Code definitions.
// These exceptions are derived from the debug protocol definitions in the EFI
// specification.
//
#define EFI_SW_EC_IA32_DIVIDE_ERROR             EXCEPT_IA32_DIVIDE_ERROR
#define EFI_SW_EC_IA32_DEBUG                    EXCEPT_IA32_DEBUG
```

```
#define EFI_SW_EC_IA32_NMI                    EXCEPT_IA32_NMI
#define EFI_SW_EC_IA32_BREAKPOINT             EXCEPT_IA32_BREAKPOINT
#define EFI_SW_EC_IA32_OVERFLOW               EXCEPT_IA32_OVERFLOW
#define EFI_SW_EC_IA32_BOUND                  EXCEPT_IA32_BOUND
#define EFI_SW_EC_IA32_INVALID_OPCODE         EXCEPT_IA32_INVALID_OPCODE
#define EFI_SW_EC_IA32_DOUBLE_FAULT           EXCEPT_IA32_DOUBLE_FAULT
#define EFI_SW_EC_IA32_INVALID_TSS            EXCEPT_IA32_INVALID_TSS
#define EFI_SW_EC_IA32_SEG_NOT_PRESENT        EXCEPT_IA32_SEG_NOT_PRESENT
#define EFI_SW_EC_IA32_STACK_FAULT            EXCEPT_IA32_STACK_FAULT
#define EFI_SW_EC_IA32_GP_FAULT               EXCEPT_IA32_GP_FAULT
#define EFI_SW_EC_IA32_PAGE_FAULT             EXCEPT_IA32_PAGE_FAULT
#define EFI_SW_EC_IA32_FP_ERROR               EXCEPT_IA32_FP_ERROR
#define EFI_SW_EC_IA32_ALIGNMENT_CHECK        EXCEPT_IA32_ALIGNMENT_CHECK
#define EFI_SW_EC_IA32_MACHINE_CHECK          EXCEPT_IA32_MACHINE_CHECK
#define EFI_SW_EC_IA32_SIMD                   EXCEPT_IA32_SIMD


//
// Software Class IPF Exception Subclass Error Code definitions.
// These exceptions are derived from the debug protocol definitions in the EFI
// specification.
//
#define EFI_SW_EC_IPF_ALT_DTLB                EXCEPT_IPF_ALT_DTLB
#define EFI_SW_EC_IPF_DNESTED_TLB             EXCEPT_IPF_DNESTED_TLB
#define EFI_SW_EC_IPF_BREAKPOINT              EXCEPT_IPF_BREAKPOINT
#define EFI_SW_EC_IPF_EXTERNAL_INTERRUPT      EXCEPT_IPF_EXTERNAL_INTERRUPT
#define EFI_SW_EC_IPF_GEN_EXCEPT              EXCEPT_IPF_GEN_EXCEPT
#define EFI_SW_EC_IPF_NAT_CONSUMPTION         EXCEPT_IPF_NAT_CONSUMPTION
#define EFI_SW_EC_IPF_DEBUG_EXCEPT            EXCEPT_IPF_DEBUG_EXCEPT
#define EFI_SW_EC_IPF_UNALIGNED_ACCESS        EXCEPT_IPF_UNALIGNED_ACCESS
#define EFI_SW_EC_IPF_FP_FAULT                EXCEPT_IPF_FP_FAULT
#define EFI_SW_EC_IPF_FP_TRAP                 EXCEPT_IPF_FP_TRAP
#define EFI_SW_EC_IPF_TAKEN_BRANCH            EXCEPT_IPF_TAKEN_BRANCH
#define EFI_SW_EC_IPF_SINGLE_STEP             EXCEPT_IPF_SINGLE_STEP


//
// Software Class PEI Service Subclass Error Code definitions.
//


//
// Software Class EFI Boot Service Subclass Error Code definitions.
//


//
// Software Class EFI Runtime Service Subclass Error Code definitions.


//
//
// Software Class EFI DXE Service Subclass Error Code definitions.
//
```

Extended Error Data

In addition to the other class-specific error definitions in this subsection, the Host Software class uses the following extended error data definitions:

- **EFI_DEVICE_HANDLE_EXTENDED_DATA**

See Common Status Code Definitions: Extended Error Data for its definition.

EFI_DEBUG_ASSERT_DATA

Summary

This structure provides the assert information that is typically associated with a debug assertion failing.

Prototype

```
struct {
  EFI_STATUS_CODE_DATA          DataHeader;
  UINT32                        LineNumber;
  UINT32                        FileNameSize;
  EFI_STATUS_CODE_STRING_DATA   *FileName;
} EFI_DEBUG_ASSERT_DATA;
```

Parameters

DataHeader

The data header identifying the data. *DataHeader.HeaderSize* should be **sizeof (EFI_STATUS_CODE_DATA)**, *DataHeader.Size* should be **sizeof (EFI_DEBUG_ASSERT_DATA) –** *HeaderSize*, and *DataHeader.Type* should be **EFI_STATUS_CODE_SPECIFIC_DATA_GUID**.

LineNumber

The line number of the source file where the fault was generated.

FileNameSize

The size in bytes of *FileName*.

FileName

A pointer to a **NULL**-terminated ASCII or Unicode string that represents the file name of the source file where the fault was generated. Type **EFI_STATUS_CODE_STRING_DATA** is defined in Common Status Code Definitions.

Description

The data indicates the location of the assertion that failed in the source code. This information includes the file name and line number that are necessary to find the failing assertion in source code.

EFI_STATUS_CODE_EXCEP_EXTENDED_DATA

Summary

This structure defines extended data describing a processor exception error.

Prototype

```
typedef struct {
  EFI_STATUS_CODE_DATA                    DataHeader;
  EFI_STATUS_CODE_EXCEP_SYSTEM_CONTEXT    Context;
} EFI_STATUS_CODE_EXCEP_EXTENDED_DATA;
```

Parameters

DataHeader

The data header identifying the data. *DataHeader.HeaderSize* should be **sizeof (EFI_STATUS_CODE_DATA)**, *DataHeader.Size* should be **sizeof (EFI_STATUS_CODE_EXCEP_EXTENDED_DATA) – HeaderSize**, and *DataHeader.Type* should be **EFI_STATUS_CODE_SPECIFIC_DATA_GUID**.

Context

The system context. Type **EFI_STATUS_CODE_EXCEP_SYSTEM_CONTEXT** is defined in "Related Definitions" below.

Description

This extended data allows the processor context that is present at the time of the exception to be reported with the exception. The format and contents of the context data varies depending on the processor architecture.

Related Definitions

```
//*******************************************************
// EFI_STATUS_CODE_EXCEP_SYSTEM_CONTEXT
//*******************************************************
typedef union {
  EFI_SYSTEM_CONTEXT_EBC      SystemContextEbc;
  EFI_SYSTEM_CONTEXT_IA32     SystemContextIa32;
  EFI_SYSTEM_CONTEXT_IPF      SystemContextIpf;
} EFI_STATUS_CODE_EXCEP_SYSTEM_CONTEXT;
```

SystemContextEbc

The context of the EBC virtual machine when the exception was generated. Type **EFI_SYSTEM_CONTEXT_EBC** is defined in **EFI_DEBUG_SUPPORT_PROTOCOL** in the *EFI 1.10 Specification*.

SystemContextIa32

The context of the IA-32 processor when the exception was generated. Type **EFI_SYSTEM_CONTEXT_IA32** is defined in the **EFI_DEBUG_SUPPORT_PROTOCOL** in the *EFI 1.10 Specification.*

SystemContextIpf

The context of the Itanium® processor when the exception was generated. Type **EFI_SYSTEM_CONTEXT_IPF** is defined in the **EFI_DEBUG_SUPPORT_PROTOCOL** in the *EFI 1.10 Specification.*

EFI_STATUS_CODE_START_EXTENDED_DATA

Summary

This structure defines extended data describing a call to a driver binding protocol start function.

Prototype

```
typedef struct {
  EFI_STATUS_CODE_DATA          DataHeader;
  EFI_HANDLE                    ControllerHandle;
  EFI_HANDLE                    DriverBindingHandle;
  UINT16                        DevicePathSize;
  UINT8                         RemainingDevicePath[];
} EFI_STATUS_CODE_START_EXTENDED_DATA;
```

Parameters

DataHeader

The data header identifying the data. *DataHeader.HeaderSize* should be **sizeof (EFI_STATUS_CODE_DATA)**, *DataHeader.Size* should be **sizeof (EFI_STATUS_CODE_START_EXTENDED_DATA) -** *HeaderSize*, and *DataHeader.Type* should be **EFI_STATUS_CODE_SPECIFIC_DATA_GUID**.

ControllerHandle

The controller handle.

DriverBindingHandle

The driver binding handle.

DevicePathSize

The size of the *RemainingDevicePath*. It is zero if the **Start()** function is called with *RemainingDevicePath* **= NULL**. The *EFI 1.10 Specification* allows that the **Start()** function of bus drivers can be called in this way.

RemainingDevicePath

Matches the *RemainingDevicePath* parameter being passed to the **Start()** function. Note that this parameter is the variable-length device path and not a pointer to the device path.

Description

This extended data records information about a **Start()** function call. **Start()** is a member of the EFI 1.10 Driver Binding Protocol.

EFI_LEGACY_OPROM_EXTENDED_DATA

Summary

This structure defines extended data describing a legacy option ROM (OpROM).

Prototype

```
typedef struct {
  EFI_STATUS_CODE_DATA                    DataHeader;
  EFI_HANDLE                              DeviceHandle;
  EFI_PHYSICAL_ADDRESS                    RomImageBase;
} EFI_LEGACY_OPROM_EXTENDED_DATA;
```

Parameters

DataHeader

The data header identifying the data. *DataHeader.HeaderSize* should be **sizeof (EFI_STATUS_CODE_DATA)**, *DataHeader.Size* should be **sizeof (EFI_LEGACY_OPROM_EXTENDED_DATA) -** *HeaderSize*, and *DataHeader.Type* should be **EFI_STATUS_CODE_SPECIFIC_DATA_GUID**.

DeviceHandle

The handle corresponding to the device that this legacy option ROM is being invoked.

RomImageBase

The base address of the shadowed legacy ROM image. May or may not point to the shadow RAM area. Type **EFI_PHYSICAL_ADDRESS** is defined in **AllocatePages()** in the *EFI 1.10 Specification.*

Description

The device handle and ROM image base can be used by consumers to determine which option ROM failed. Due to the black-box nature of legacy option ROMs, the amount of information that can be obtained may be limited.