Proposal for Queuing Model Definitions and Task States

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Terminology

- Execute (v) - To perform the work of a task or task management function.

- Complete (v) - To end a task and return a Command Complete response.

- Abort (v) - To end a task without returning a Command Complete response.

- End (v) - To abort or complete a task.

- Suspended Information - Information that is concealed from a task until the task enters the enabled state.
Task State Definitions:

- Dormant - The task is prevented from beginning execution. The conditions under which a dormant task becomes enabled depend on its task attribute.

- Enabled - The task may complete at any time. An enabled task that has been aborted may have altered the logical unit state.

- Blocked - A previously enabled task that is prevented from completing due to an ACA condition.
Task State Definitions (con't)

- Termination Pending - The state of a task previously in the Held or Blocked states after a TERMINATE TASK function has been issued. The task shall be completed when the ACA condition is cleared.

- Held - The state of all previously dormant tasks within a task set while an ACA is in effect.

- Aborted - The state of a task that has been aborted as the result of a task management abort function or an exception condition (e.g., bus reset or ACA with Qerr flag set in the mode page).

- Done - The state of a completed task.
Task Execution Model

- A task is executed through the following remote procedure call:

  Service Response = Execute Command (Task Identifier, Command descriptor block, [Input arguments]) || [Output arguments,] [Autosense data,] Status

- Command execution begins when the task becomes enabled.

- The state of all outputs is undefined until the remote procedure completes and a service response is successfully received by the initiator.

- The state of all outputs is undefined if a task is aborted or fails to complete.
Suspended Information

- While an ordered task is in the dormant or held state, any information the logical unit has or accepts for the task shall be suspended. (QM rev 7, section 7).
- While a simple task is in the Dormant or Held state, any information the target accepts for the task shall be suspended (QM rev. 7, sections 7 and 8).
- While a task is in the blocked state, any information the logical unit accepts for the task shall be suspended (QM rev 7, section 3.1.2).
- While a task is in the Termination Pending state, any information the logical unit has or accepts for the task shall be suspended.
Litmus test

- All tasks shall behave as if they were created upon entering the enabled state.
- The results of task execution completion are independent of whether or not the task was in the dormant state.
Task States - Simple, Ordered and Head of Queue Tasks

Simple task: All previous HEAD OF QUEUE and previous ORDERED tasks ended.

HEAD OF QUEUE Task Created.

Simple or ORDERED Task Created.

Dormant

Ordered task: All previous tasks ended.

Enabled

Done

Task Complete

TERMINATE TASK

CLEAR ACA

Held

TERMINATE TASK

TERMINATE TASK

TERMINATE TASK

TERMINATE TASK

Termination Pending

CLEAR ACA

Aborted

See note 1

See note 1

See note 1

See note 2

See note 2

Termination Pending

CLEAR ACA

ACA (Qerr clear)

ACA (Qerr clear)

Note 1: ABORT TASK SET, ABORT TASK, CLEAR TASK SET, TARGET RESET, Hard Reset.

Note 2: Abort conditions from note 1 or ACA while Qerr flag is set.
Task States - ACA

- **Enabled**: ACA Task Created
- **Done**: Task Complete
- **Aborted**: ABORT TASK SET, ABORT TASK, CLEAR QUEUE, TARGET RESET, Hard reset
Ordered Tasks and Blocking Boundaries

Task Set

- Simple Task 1
- Simple Task 2
- Ordered Task 3
- Simple Task 4
- Simple Task 5
- Ordered Task 6

Ordered Blocking Boundary

Tasks 1 and 2 Terminate

Task Set

- Ordered Task 3
- Simple Task 4
- Simple Task 5
- Ordered Task 6

Enabled Tasks

Task Set

- Simple Task 4
- Simple Task 5
- Ordered Task 6

Enabled Tasks

Dormant Tasks

Task 3 Terminates

Dormant Task
Head of Queue Tasks and Ordered Blocking Boundaries

1. Task Set
   - Head of Queue Task 9
     - Simple Task 1
     - Simple Task 2
     - Simple Task 4
     - Simple Task 5
     - Simple Task 6
   - Enabled Tasks
   - Dormant Tasks
   - Task 7 Created, Task 2 Terminated.

2. Task Set
   - Head of Queue Task 7
     - Simple Task 1
     - Simple Task 4
     - Simple Task 5
     - Simple Task 6
   - Enabled Tasks
   - Dormant Tasks

3. Task Set
   - Head of Queue Task 7
     - Simple Task 1
     - Simple Task 4
     - Simple Task 5
     - Simple Task 6
   - Enabled Tasks
   - Ordered Blocking Boundary
   - Tasks 3 Completes

4. Task Set
   - Simple Task 1
   - Simple Task 5
   - Enabled Tasks
   - Ordered Blocking Boundary
   - Tasks 4, 6 and 7 Complete
ACA Task Example

Task Set

Task 2 Completes with Check Condition Status

Dormant Tasks

Task 3 Aborted, Task 7 Created

Task 7 Completes With GOOD Status CLEAR ACA Issued.

Enabled Task

Blocked Task

Held Tasks

Ordered Blocking Boundary

Enabled Tasks

Blocked Task

Held Tasks

Ordered Task 3

Simple Task 4

Simple Task 5

Ordered Task 6

Simple Task 1

Simple Task 2

Ordered Task 3

Simple Task 4

Simple Task 5

Ordered Task 6