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.

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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.

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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.

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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.

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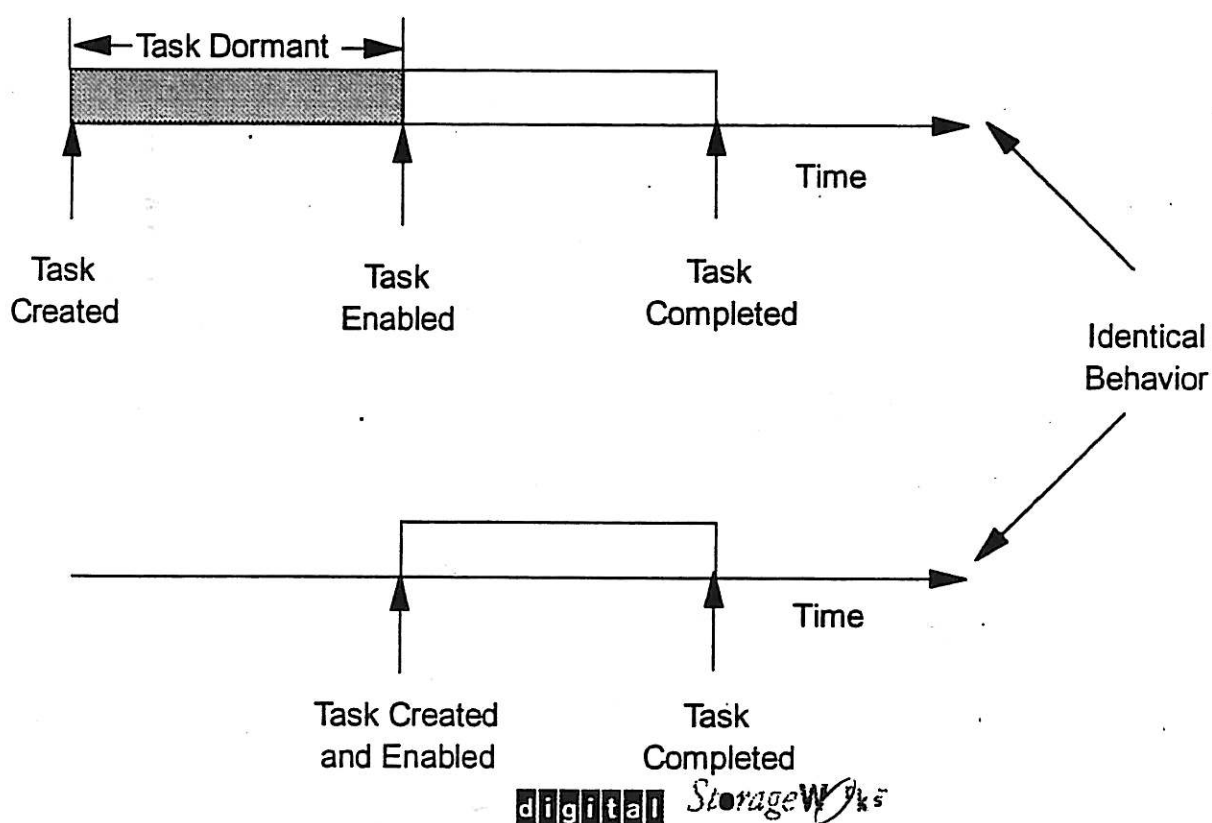
Suspended Information

- 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.

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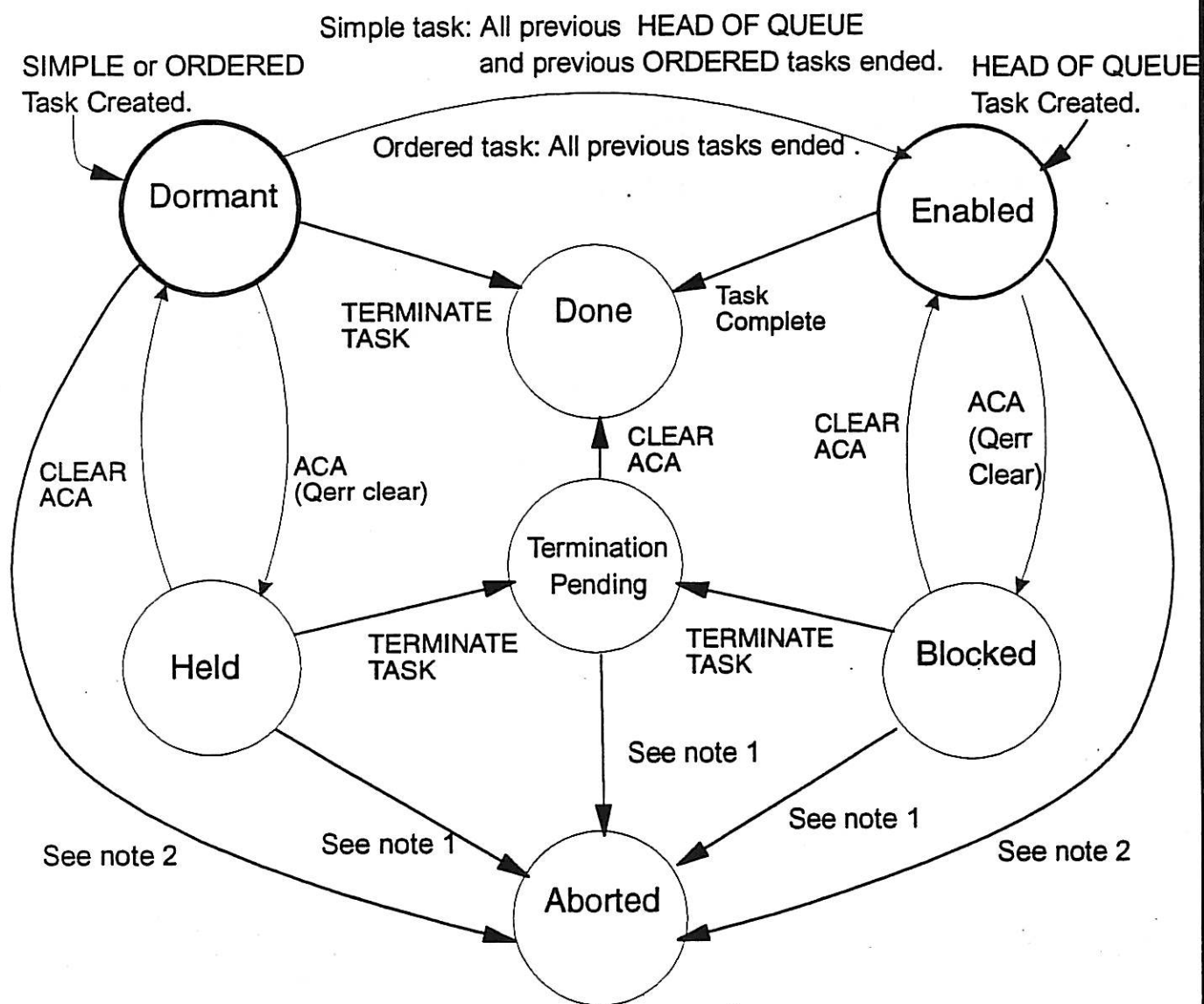
Litmus test

- All tasks shall behave as if they were created upon entering the enabled state.
  - The results of task ~~execution~~ <u>completion</u> are independent of whether or not the task was in the dormant state.

Task Dormant

Task
Created

Task
Enabled

Task
Completed

Time

Identical
Behavior

Task Created
and Enabled

Task
Completed

Time

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Task States - Simple, Ordered and Head of Queue Tasks

SIMPLE or ORDERED
Task Created.

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

HEAD OF QUEUE
Task Created.

Ordered task: All previous tasks ended .

Dormant

Enabled

TERMINATE
TASK

Done

Task
Complete

CLEAR
ACA

CLEAR
ACA

ACA
(Qerr clear)

CLEAR
ACA

ACA
(Qerr
Clear)

**Termination
Pending**

Held

TERMINATE
TASK

TERMINATE
TASK

Blocked

See note 1

See note 2
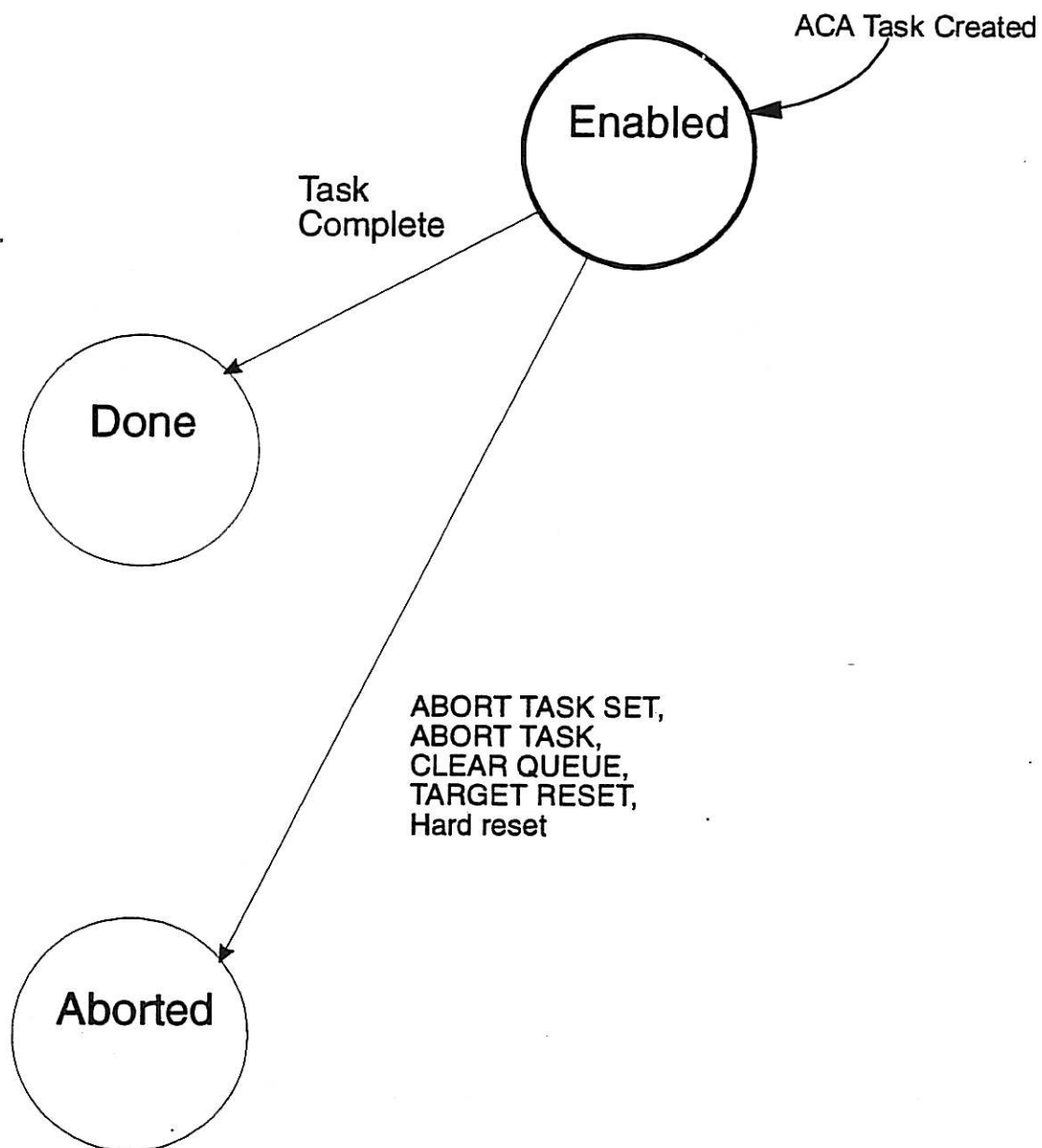
See note 1

See note 1

See note 2

Aborted

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.
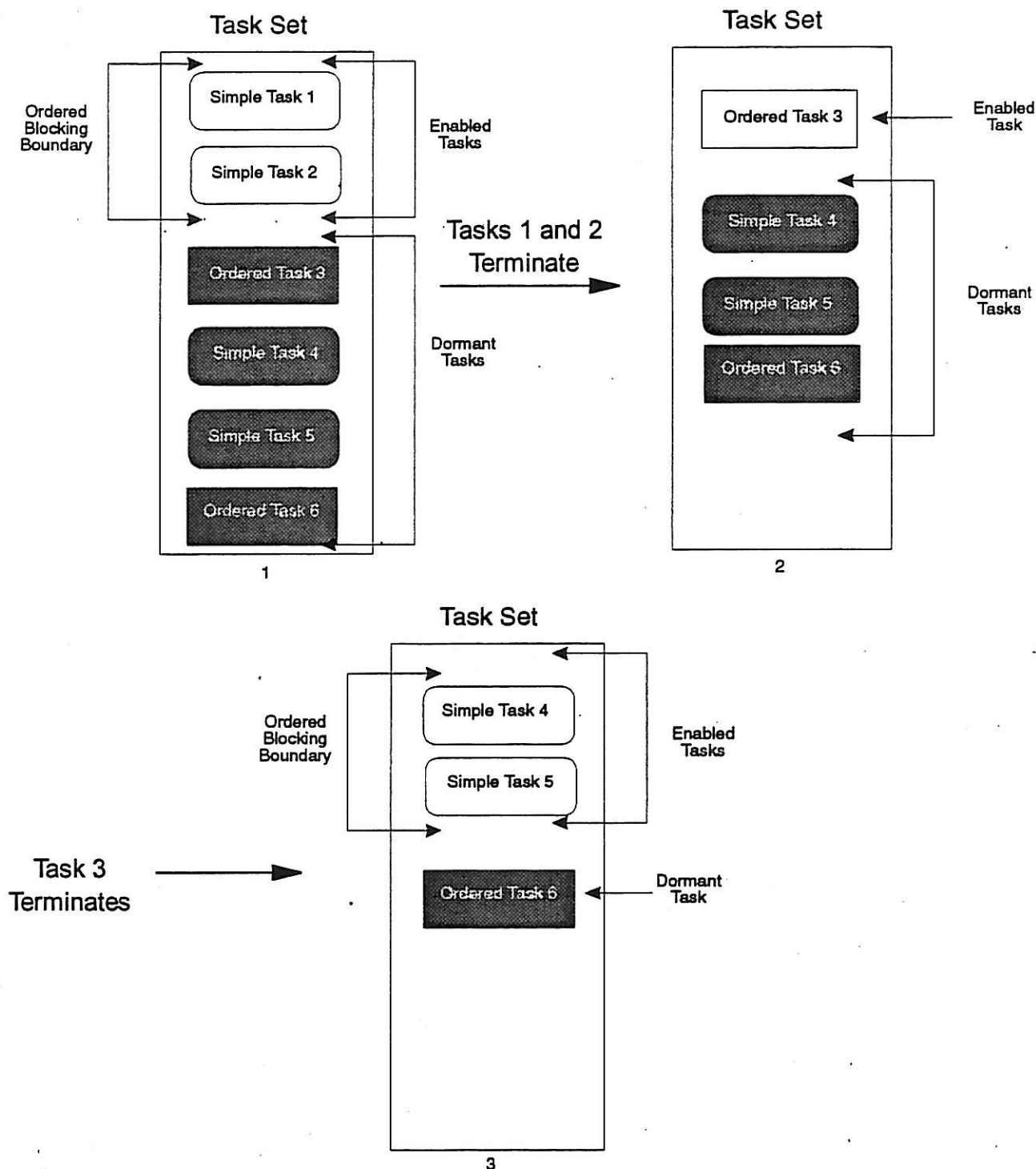
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Task States - ACA

ACA Task Created
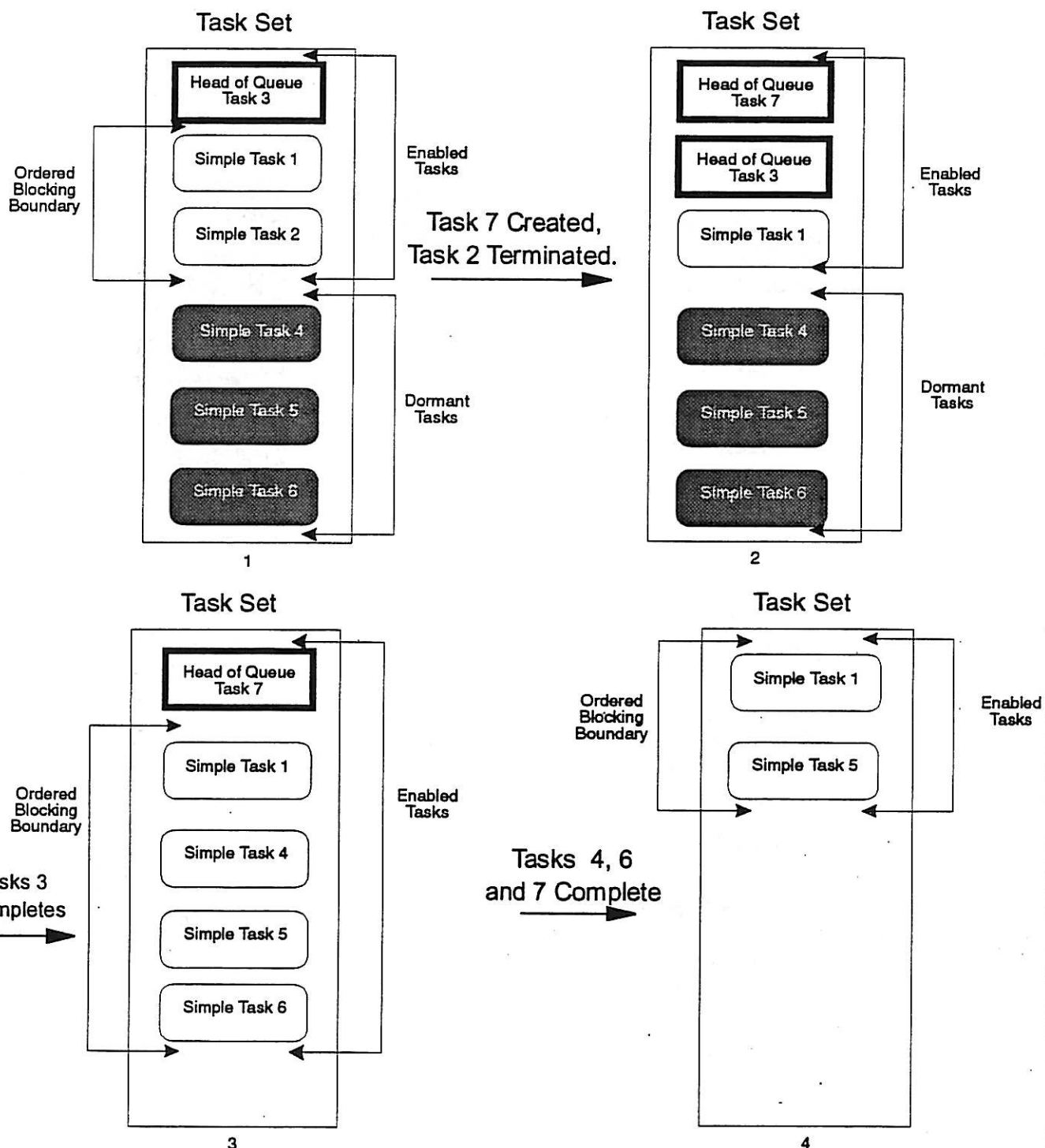
Enabled

Task
Complete

Done

ABORT TASK SET,
ABORT TASK,
CLEAR QUEUE,
TARGET RESET,
Hard reset

Aborted

Ordered Tasks and Blocking Boundaries

Head of Queue Tasks and Ordered Blocking Boundaries

Task Set

Head of Queue Task 3

Simple Task 1

Simple Task 2

Simple Task 4

Simple Task 5

Simple Task 6

Ordered Blocking Boundary

Enabled Tasks

Dormant Tasks

1

Task 7 Created, Task 2 Terminated.

Task Set

Head of Queue Task 7

Head of Queue Task 3

Simple Task 1

Simple Task 4

Simple Task 5

Simple Task 6

Enabled Tasks

Dormant Tasks

2

Task Set

Head of Queue Task 7

Simple Task 1

Simple Task 4

Simple Task 5

Simple Task 6

Ordered Blocking Boundary

Enabled Tasks

Tasks 3 Completes

3

Tasks 4, 6 and 7 Complete

Task Set

Simple Task 1

Simple Task 5

Ordered Blocking Boundary

Enabled Tasks

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ACA Task Example

Task Set

Task 2 Completes with Check Condition Status →

Task Set

Task Set

Task 3 Aborted, Task 7 Created →

Task 7 Completes With GOOD Status, CLEAR ACA Issued. →

Task Set

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