Date: June 15, 2004

To: T10 Committee (SCSI)

From: George Penokie (IBM/Tivoli)

Subject: SAM-3: Resolving Head Of Queue Inconsistencies

1 Overview

In SAM-3 the definition of how head of Queue tasks are handled is inconsistent. The wording in sections 8.6.4, 8.9.1, and 8.9.2 is inconsistent with the wording in sections 8.6.2, 8.6.3, 8.8 and figure 39. The relevant wording in those sections is as follows.

These statements:

8.6.4 Head of queue task

If accepted, a task having the HEAD OF QUEUE attribute shall be entered into the task set in the <u>enabled task state</u>.

8.5.2 Enabled task state

A task in the enabled task state may become a current task and may complete at any time, subject to the task completion constraints specified in the Control mode page (see SPC-3). A task that has been accepted into the task set shall not complete or become a current task unless it is in the enabled task state.

8.9.1 Introduction

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A task set is shown as an ordered list or queue of tasks with the head of the queue towards the top of the figure. A new head of queue task <u>always enters the task set at the head, displacing older head of queue tasks</u>. Simple, ordered and ACA tasks always enter the task set at the end of the queue.

8.9.2 Head of queue tasks

In snapshot 1 the task set initially contains one head of queue and one simple task. As shown by the blocking boundary, simple task 2 is in the dormant task state because of the older head of queue task. Snapshot 2 shows the task set after head of queue task 3 and simple task 4 are created. <u>The new head of queue task is placed at the front of the queue in the enabled task state, displacing task 1.</u> Snapshot 3 shows the task set after task 3 completes. Since the conditions indicated by the task 1 blocking boundary are still in effect, tasks 2 and 4 remain in the dormant task state.

Are inconsistent with these statements:

8.6.2 Simple task

If accepted, a task having the SIMPLE attribute shall be entered into the task set in the dormant task state. The task shall not enter the enabled task state until all <u>**older**</u> head of queue tasks and older ordered tasks in the task set have ended (see 8.4).

8.6.3 Ordered task

If accepted, a task having the ORDERED attribute shall be entered into the task set in the dormant task state. The task shall not enter the enabled task state <u>until all older tasks</u> in the task set have ended (see 8.4).

8.8 Task state transitions

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ACA is not active and:

    a)   For simple tasks, all <u>**older**</u> head of queue and all older ordered tasks have ended; or
    b)   For ordered tasks, <u>all older </u>ordered tasks have ended.

....

Transition S1:S2: The task attribute of a dormant task shall affect the transition to the enabled task state as follows:

    a) A dormant task having the SIMPLE task attribute shall enter the enabled task state when all <u>older</u> head of queue and older ordered tasks (see 8.4) have ended; or

    b) A dormant task having the ORDERED task attribute shall enter the enabled task state when <u>all older</u> tasks (see 8.4) have ended.

2 Inconsistencies

So according to the above a head of queue task must follow quantum physics as it is required to be both in the enabled state and not in the enabled state at the same time. If not then how can a simple task leave the enabled state when all older head of queue tasks have ended when all head of queue task enter the enabled state regardless of age. The same is true for ordered tasks.

3 Proposal

Fix the inconsistencies to make head of queue work like it was intended and how it has been implemented. To do this make the following changes:

8.6.2 Simple task

If accepted, a task having the SIMPLE attribute shall be entered into the task set in the dormant task state. The task shall not enter the enabled task state until all ~~older~~ head of queue tasks and older ordered tasks in the task set have ended (see 8.4).

8.6.3 Ordered task

If accepted, a task having the ORDERED attribute shall be entered into the task set in the dormant task state. The task shall not enter the enabled task state until all <u>head of queue tasks and</u> older tasks in the task set have ended (see 8.4).

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Transition S1:S2: The task attribute of a dormant task shall affect the transition to the enabled task state as follows:

    a) A dormant task having the SIMPLE task attribute shall enter the enabled task state when all ~~older~~ head of queue and older ordered tasks (see 8.4) have ended; or

    b) A dormant task having the ORDERED task attribute shall enter the enabled task state when <u>head of queue tasks and </u>all older tasks (see 8.4) have ended.