

### Introduction

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Threads vs. Events.

Slide 2

Robert Gezelter Software Consultant In recent years, Threads have been the rage. Like most fads, Threads have strengths and weaknesses which must be considered when planning software development.

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A process contains multiple threads: Each thread may computable or blocked at any instant in time.

Examples:

DECthreads, Windows NT

Event Model:

A process consists of the processing of a series of events. At any instant in time, a single event is being processed.

Examples:

**OpenVMS AST, X-Windows** 

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Threads	VS.	Events –
A Com	par	rison

- Mathematically Equivalent
- Significant Complexity Difference
- Which is better?

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Threading:

*If no interactions, simple application implementation.* 

If there are interactions between threads, then the interactions require locking and other mechanisms to prevent subtle programming errors from causing failures.

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Events:	Process Types
Each event is treated as an independent transaction by the program. Pre-emption is not permitted, so there are no locks or synchronization required to access data structures during the processing of a single event.	<ul> <li>Heavyweight</li> <li>Lightweight</li> <li>Featherweight</li> </ul>
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### Heavyweight Processes

- Separate Register Set
- Separate Stack
- Separately Dispatchable
- Separate Address Space
- Expensive Creation

# Lightweight

- Separate Register Set
- Separate Stack
- Separately Dispatchable
- Preemptable
- Low resource consumption

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## Featherweight

- Shared Register Set
- Shared (nested) Stack
- Separate Address Space
- Extremely inexpensive Creation
- No preemption
- Implicit synchronization
- Extremely inexpensive

When Threads/Events?

Use threads only when there a payoff.

Pre-emption only pays when CPU saturation occurs.

Hierarchy of Effort

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Threading	Implementation
Basics	-

- preemption model
- priority model
- debugging
- application suitability

Events (Non-Preemptible Threads)

• FIFO

- Non-preemptable
- 'Featherweight'

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Event Processing —

- External events control program
- Programs need to be efficient
- External event sequence is not under program control
- No Dispatch Routine

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### Summary:

The minimum needed level of complexity is desireable. If your application is not operating in a CPU saturated environment, then the performance benefits of pre-emptible threads are illusory at best, and represent a significant increase in the complexity of your application over the functionally equivalent application using events.

#### Questions?

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