

Runtime Systems Report

Runtime Systems Workshop
March 11, 2015

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Process

- April 9th, 2014: “Runtime Summit” at DC
 - All report authors in attendance
 - Day-long meeting to brainstorm requirements for exascale runtimes
- September 8th, 2014: Began writing runtime report
 - Met every 2-4 weeks since then for status updates and discussions
 - Different sections “assigned” to different author(s), but all authors contributed ideas to all sections

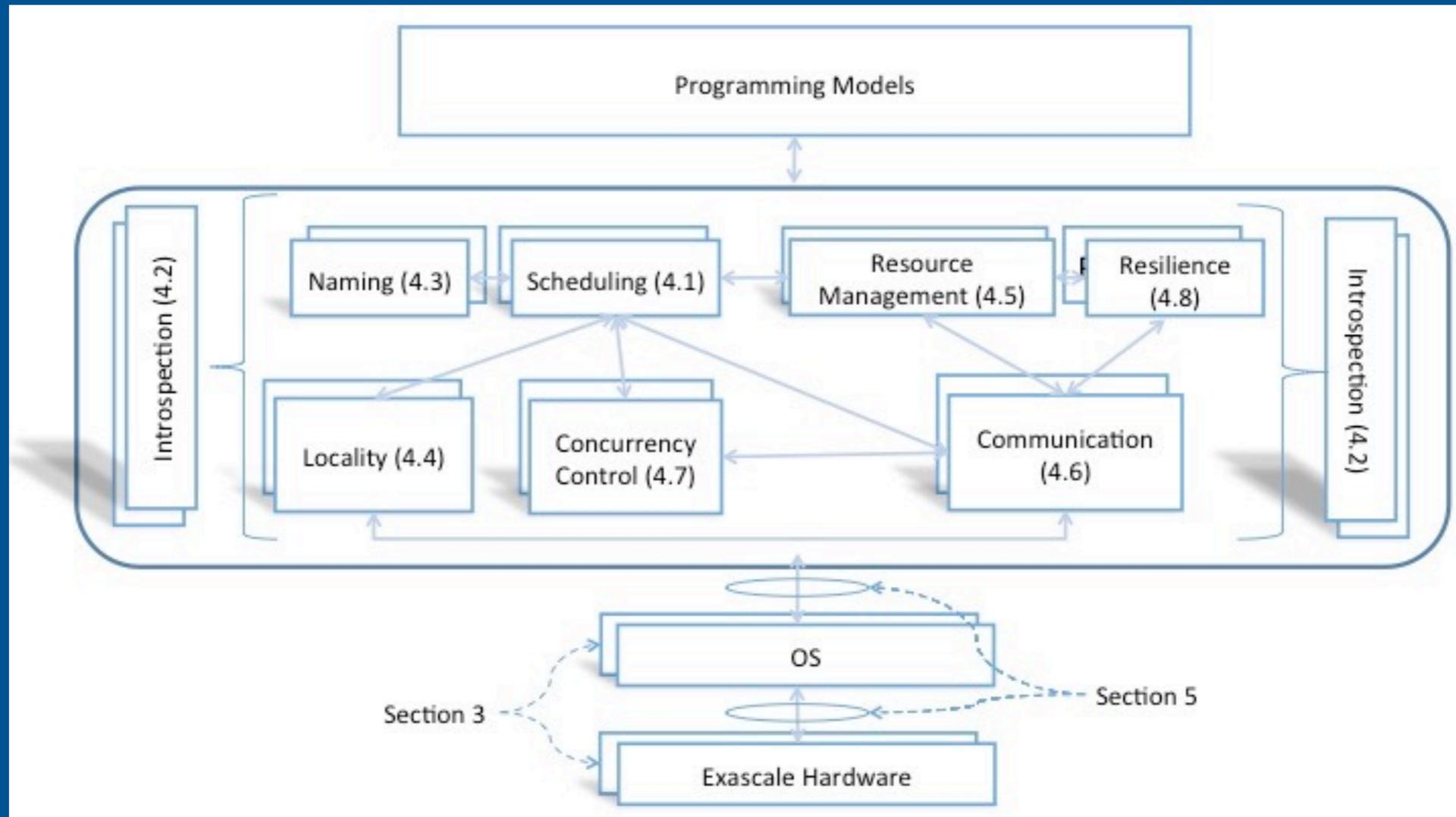
Goal

- Sketch out the requirements, roles and responsibilities of runtime systems for exascale systems
- “Context for generating a roadmap for future investments in runtime systems research”

Basic principles

- Services not architecture/design
 - What does a runtime system need to do?
What services does it need to provide?
- Try to avoid codifying particular design decisions, or particular implementation choices
- How do we provide some certainty for, e.g., application developers without overly constraining runtime development?

Overview



Categories of Services

- Scheduling
- Introspection
- Naming
- Location
- Resource Management
- Communication
- Concurrency Control
- Resilience

One “mechanism”

- Units of work (“tasks”) and data that are *nameable* and *migratable*
- Seems to be a common feature of many current research runtimes

Interfaces

- Hardware abstraction layer (Node level)
 - What abstraction should the runtime be written to?
- Hardware abstraction layer (System level)
 - Hardware needs to provide some abstraction of executing tasks
- Operating system interface
- Programming interface

Mappings

- Mapping of services to existing runtime systems
- Existing ASCR-supported runtimes support most of the identified services
- Some confidence that we may have this right