This is your operating system; Let me help you

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Introduction

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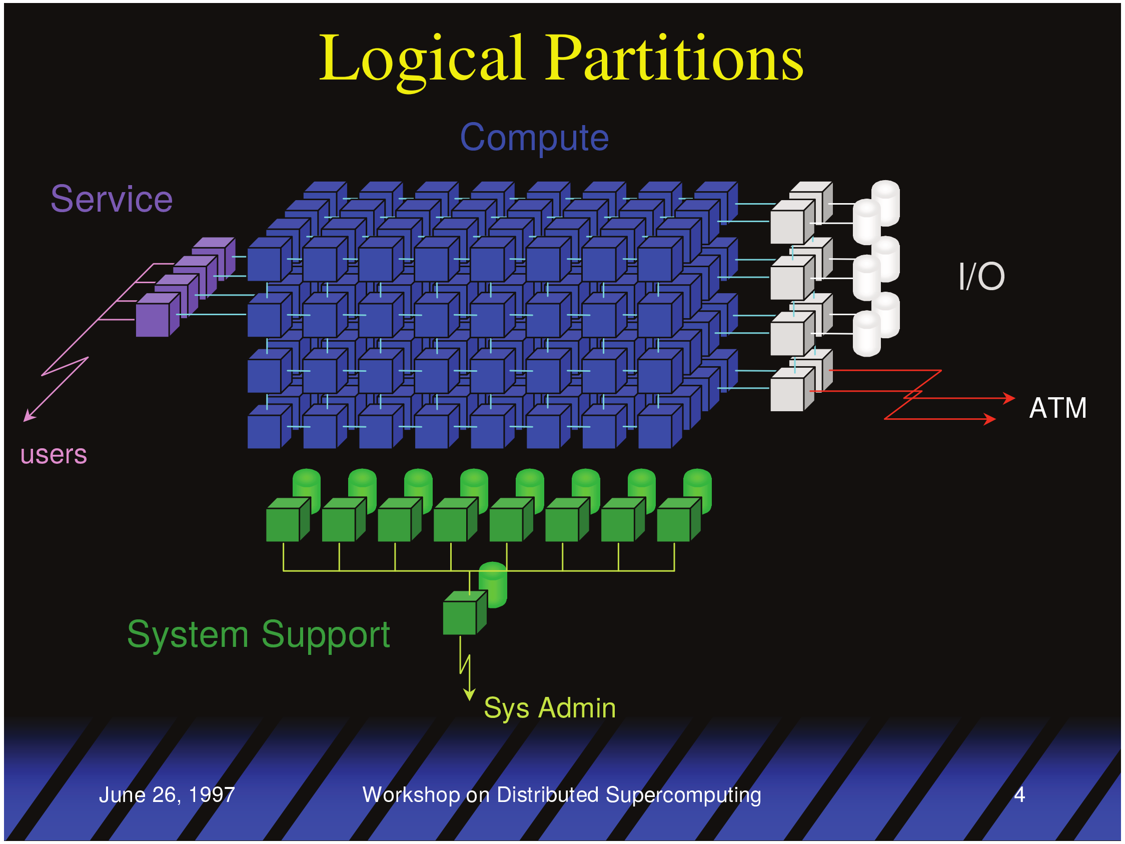
Roles
Interfaces
Details
Layers
Functions
Flexibility
mOS
Summary

- Showed this slide 19 years ago at SOS 1 in Santa Fe
- Partitioning and non-demand paged memory is still important
- Extracting a twenty-year old PowerPoint slide is not easy



Logical Partitions

June 26, 1997 Workshop on Distributed Supercomputing 4

The role of the OS

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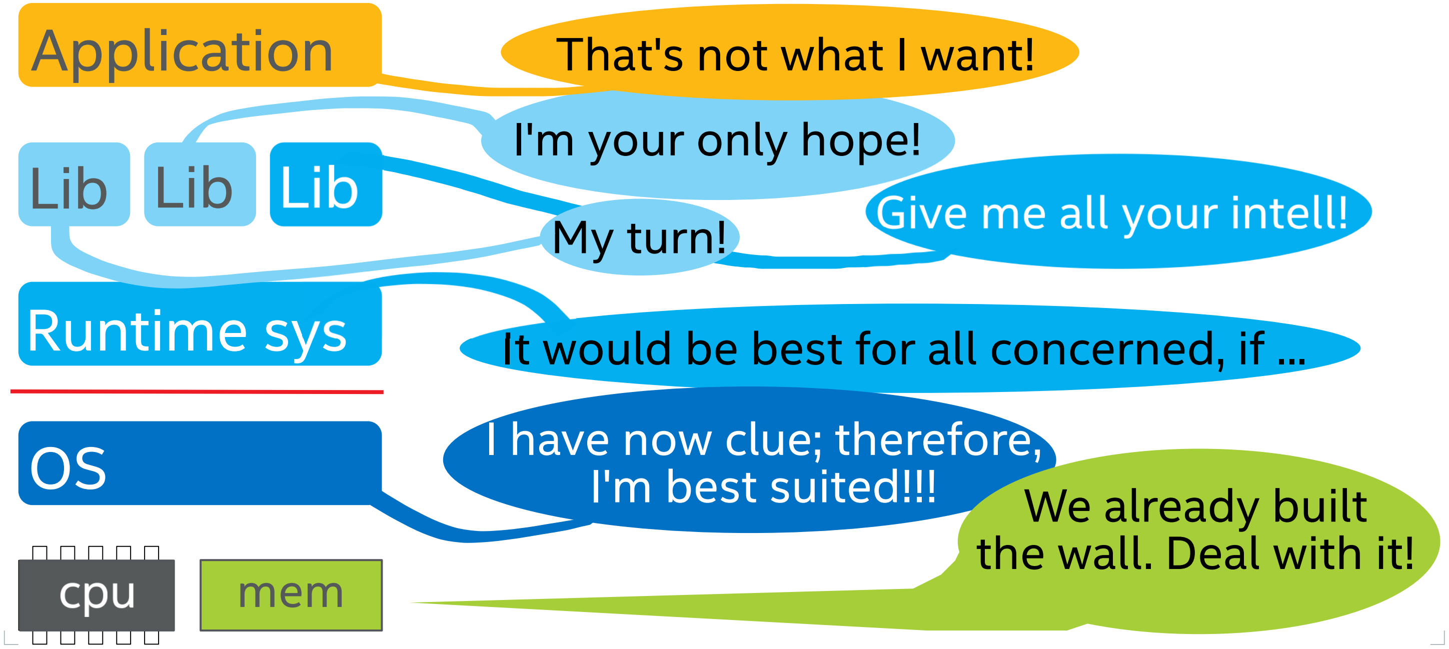
What’s the role of the OS and runtime system(s) in managing the memory hierarchy?



Application interfaces

What application interfaces are needed to help manage the memory hierarchy?

- Back to the 90s: Socket API not a good match for message passing
  - Need to know where to put the data before it arrives
- `mbind()` before `mmap()` (or flags to `mmap()`)
- `madvise()` before `mmap()` (or flags to `mmap()`)
  - Need to know page size, kind, and total size wanted
- `sched_setaffinity()` before `clone()`, or
  - `clone()` with target CPU

Level of detail

mOS

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What level of detail should the OS expose about the memory hierarchy?

- Why would anything but full detail be a good option?
- Can always hide things or add a layer of abstraction above
  - Once it is hidden, it's gone. Just like scalability

Software stack

To what level of the software stack should the OS expose details of the memory hierarchy?

- I'll target the next level up. Let them take it from there

Memory mgmt functions

What memory management functions should the run-time system contain?

- Don’t know. Maybe all?
- Thomas Sterling, Pavan, ..., have ideas and maybe answers

Flexibility and adaptability

How flexible or adaptable do memory management policies need to be?

- Very!

mOS partitioning

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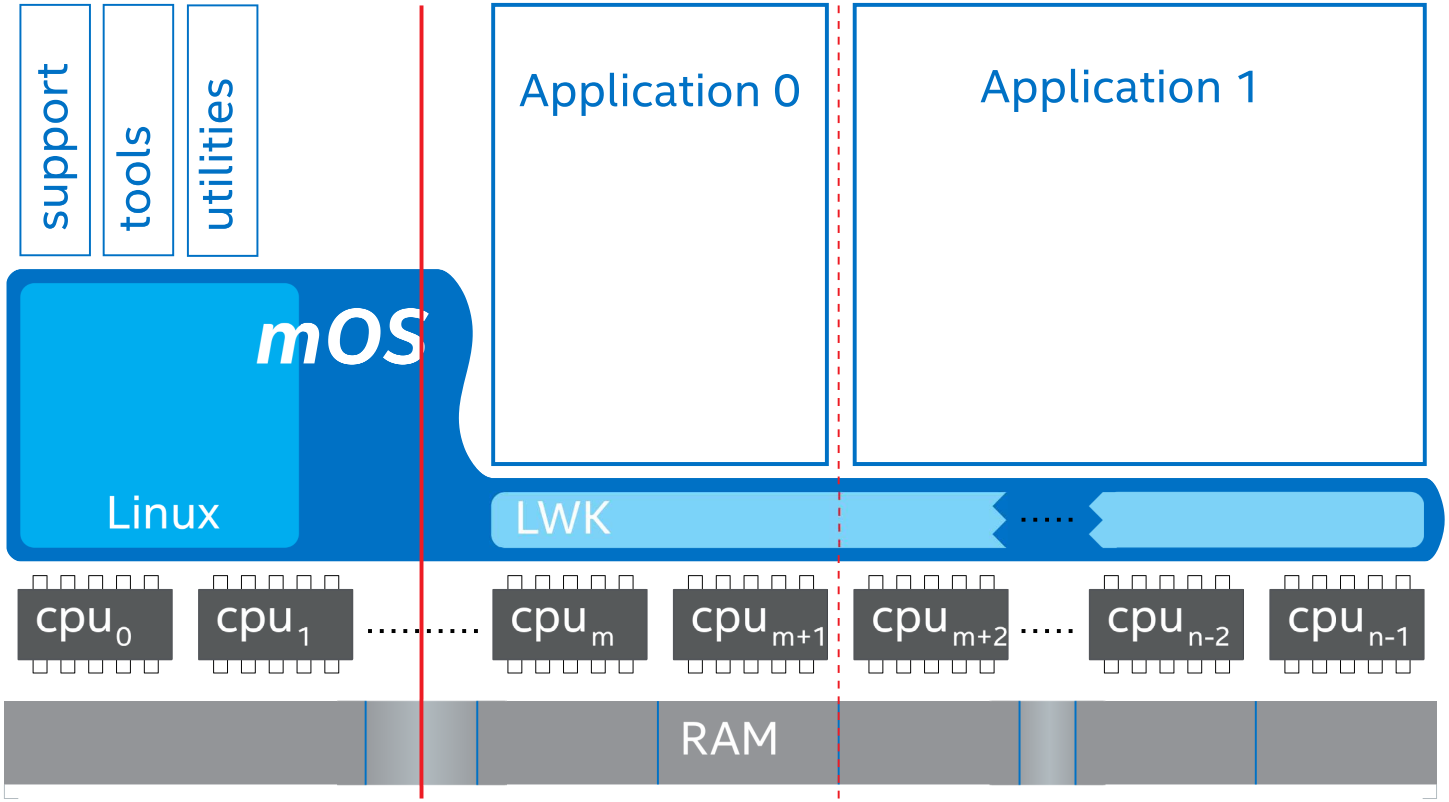
- Everything old is new again



Summary

- I'd like you (runtime, lib, app, whoever) to do it
    - Less work for me, but ...
    - Some wont do it (right)
        - What works in Linux may not be ideal for mOS
    - Will get conflicting requests from each layer
- Have to provide defaults anyway
    - Have to decide at launch and alloc time what to do
- mOS goal: Provide good (sane) defaults (for high-end HPC apps)
    - Give lots of control to upper layers and user
    - Have an override switch when they mess up ;-)
- Work with us! Tells us what you need/want, don't want

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