

Paper Critique

Title: The Multikernel: A new OS architecture for scalable multicore systems

Submitted by: Yash Aggarwal | yagga004 | 862333037

Summary:

The paper proposes the idea of multi-kernel, a new OS architecture, and Barrelfish, an implementation of the architecture. This architecture was developed for efficiency and scalability on current and future multicore computers and to be hardware independent and overcome any significant changes in the hardware and core design in the future. The idea behind the multi-kernel architecture is to partition the operating system into multiple kernels, each running on a separate core and communicating with each other through message-based communication instead of shared memory space. This would result in the OS working as a distributed system. This helps in being hardware independent and helps with scaling. The authors then describe the challenges while developing the OS, possible solutions, and a comparison with currently used operating systems like Linux and Solaris.

Strengths:

- The paper compares Barrelfish to conventional OSes and scales better with the number of cores as proposed.
- The paper provides thorough testing and comparison among the OSes.
- As proposed, the multi-kernel architecture is good at fault isolation, and it is easier to detect failures and faults as each partition is independent.
- As proposed, the multi-kernel is flexible and does not depend on the hardware, the number of cores, or the type of cores.
- Also, as all the partitions are independent, multi-kernel architecture provides increased security.

Weaknesses:

- As per the authors, implementing such an architecture is highly complex, and the message system would need many design iterations to be valid.
- Careful resource allocation must be allocated so all the partitions can function parallelly and effectively.
- Applications need to be designed keeping the OS architecture in mind, and existing applications might not be efficient if directly used.
- The architecture depends on the message-passing system, and this could be a bottleneck.