Current Debuggers for Distributed Apps

coordinating
debugger

?

debugger ↔ client application

debugger ↔ data service

debugger ↔ client application
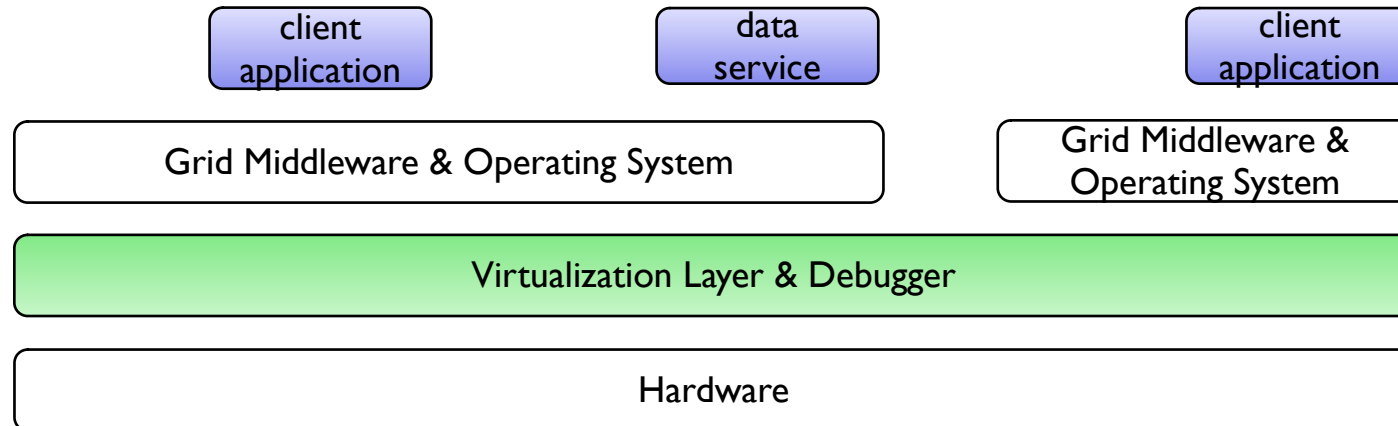
Grid Middleware & Operating System

Grid Middleware & Operating System

Hardware

Hardware
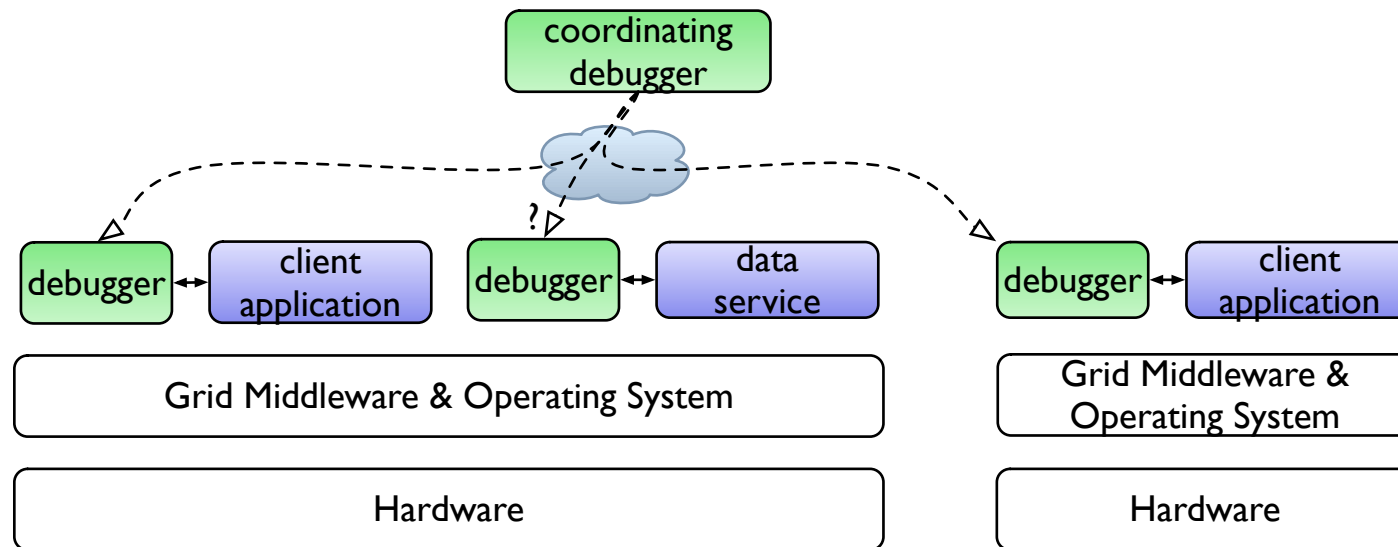
PDB: Pervasive Debugging
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Pervasive Debugging: Design

Introduce a virtual machine monitor
Debug a representative test case

client application	data service	client application

Grid Middleware & Operating System	Grid Middleware & Operating System

Virtualization Layer & Debugger

Hardware

Pervasive Debugging: Implementation

Leverage Xen virtual machine monitor
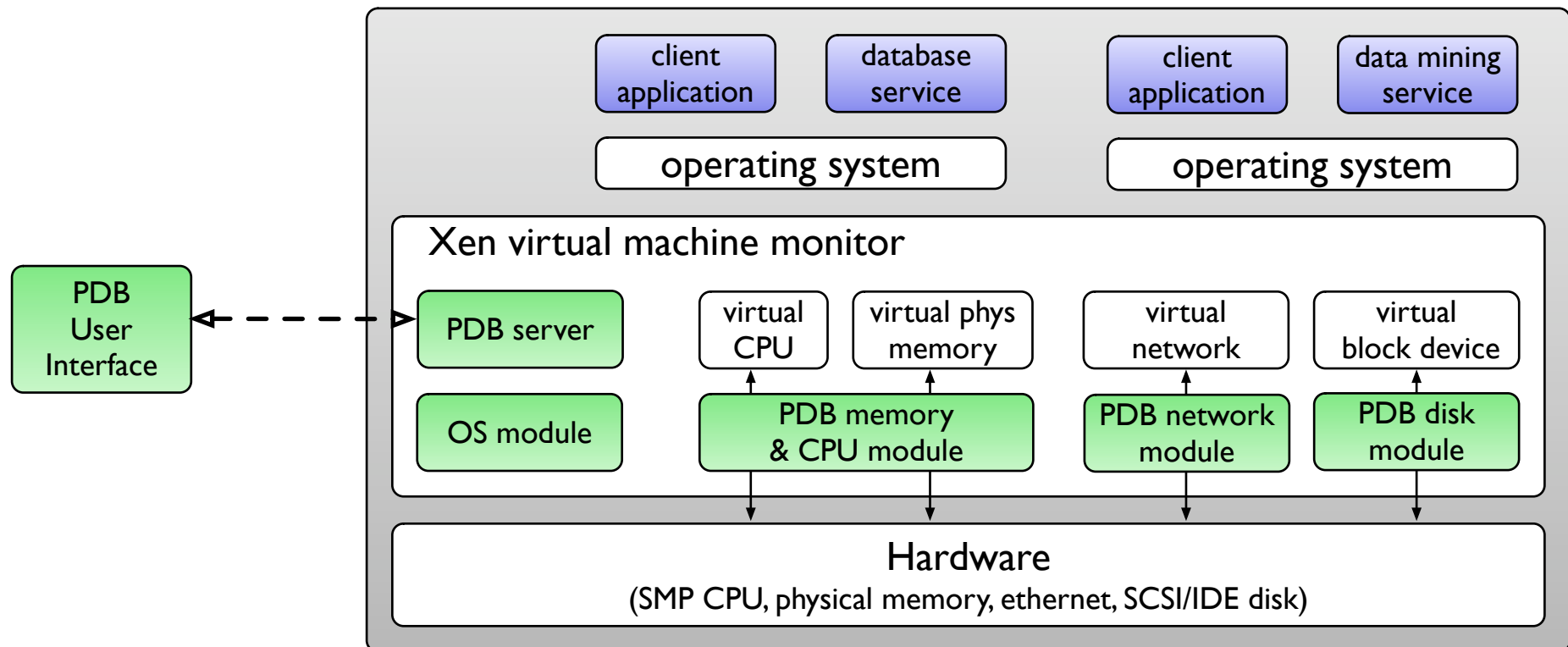
Ongoing Research

Distributed Assertions
    Primitive events
        breakpoints & watchpoints
    Composite events

Bi-directional Debugging
    Operating system suspend / resume

Directed Execution
    Fault injection
    Stress testing

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