Self-Adapting Concurrency: The DMonA Architecture

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Target applications

Flow based internet services and underlying system software

Peak loads
- Slash-dot effect
- Not feasible to over-provision resources

Varying request types
- Static vs. dynamic web requests
- Varying security needs (types of encryption)
Target applications

parse header
ACU
Reassemble fragments
Bottleneck
Decrypt data

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parse header
ACU
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ACU
Decrypt data

Workshop on Self-healing Systems 2002
New ideas/approaches

Component architecture (DiPS)
Pluggable self-healing architecture (DMonA)

Anonymous component interaction (DiPS)
Separation of concerns
   Functional vs. concurrency units (DiPS)
   Functionality vs. management (DMonA)
Self-healing aspects of DMonA

DMonA architecture

Self-monitoring & interpreting
  - Analysis & state sensors

Prescribing appropriate measures
  - Pluggable monitor strategies

Self-healing
  - Management interface
  - Dynamic concurrency control for
    - improving performance
    - Graceful degradation
DMonA architecture

Component

Packet Scheduler

Active Unit

Connector

Packet Scheduler

PF

PR

QS

SI

Active Monitor

Throughput Sensor

Monitor Strategy

Throughput Sensor

Functional Layer (DiPS)

Management Layer (DMonA)

SI Sensor Interface

QS Queue Sensor
DMonA architecture

Functional Layer (DiPS)
Management Layer (DMonA)
Conclusion

Behavior adaptability (Concurrency)
Separation of management and functionality
Reuse of functional DiPS components
DMonA is a runtime pluggable extension
Ongoing work

Functional adaptability (Hot swapping)
Combination of hot swapping extension with DMonA
Environment sensors
Available system resources
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Static & Dynamic Management

Meta monitor

Thread Pool

Resource Manager

Queue Manager

Thread Manager

Thread

Thread

Thread
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