Autonomic Computing

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- Computer Software Systems are Not Self-Managing
- Complex heterogeneous infrastructures are a reality!
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- Core Building Blocks for an open architecture
- But what about Legacy Systems?
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What is Autonomic Computing?

- Autonomic Computing is an approach, to self-managed computing systems with a minimum of human interference.
- The term autonomic comes from the autonomic nervous system.
Computer Software Systems are Not Self-Managing

NASA Satellite Support

Best Case

Worst Case
Complex heterogeneous infrastructures are a reality!
Why is this a Problem?

- Complexity in running and managing the IT infrastructure
- Too many users, not enough resources
- Software bugs and hardware failures
- Difficulty in deployment of complex systems
- Too many computational devices
- Human management of increasingly complex software systems is expensive, time-consuming, and error-prone
THE SOLUTION

- The answer is, to give this large problem to the computer to fix.
- Goal is to develop technologies to enable self-managing software systems
- Many R&D communities are excited about the idea of self-managing systems: enterprise applications, networking, safety-critical systems, high-performance computing, ...
- And are building new software systems with self-management capabilities
  
  - *Flexible*. The system will be able to sift data via a platform- and device-agnostic approach.
  - *Accessible*. The nature of the autonomic system is that it is always on.
  - *Transparent*. The system will perform its tasks and adapt to a user's needs without dragging the user into the intricacies of its workings.
Autonomic Computing
Self-managing systems that...

Increase Responsiveness
Adapt to dynamically changing environments

Business Resiliency
Discover, diagnose, and act to prevent disruptions

Operational Efficiency
Tune resources and balance workloads to maximize use of IT resources

Secure Information and Resources
Anticipate, detect, identify, and protect against attacks

...achieving the correct balance between what is managed by a person versus the system
Core Building Blocks for an open architecture

- An autonomic element contains a continuous control loop that monitors activities.

- For a system component to be self-managing, it must have an automated method to collect the details it needs from the system; to analyze those details to determine if something needs to change; to create a plan, or sequence of actions, that specifies the necessary changes; and to perform those actions.
But what about Legacy Systems?

- A “legacy system” is any software system that already exists and is in use - such as the nation’s critical information infrastructure and defense information systems
- Replacing all existing systems with new autonomic computing systems would be very expensive and take a long time
- Any existing system that isn’t already a self-managing system
- Designers may be long-gone
- May be too expensive or take too long to build a new system
Autonomizing Legacy Systems

decision → analysis

legacy system

effectors → sensors

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Analysis

- Detect particular “patterns” of events from individual sensors and across multiple sensors over periods of time
- Determine whether “something went wrong” or is “anomalous” (unexpected)
Decision

- Decide whether and when to “do something” and “what to do” to modify the legacy system
- Coordinate multiple interdependent modifications to subparts (adaptations)
How does autonomic computing help customers?

**Improved resiliency and quality of service**
- Always there when you need it
- Safe and secure

**Accelerated time to value**
- Optimizes productivity and business value
- Faster deployment of applications that execute business strategies

**Increased return on IT investment (ROI)**
- Better asset utilization
- More productive people
- Reinvestment of IT productivity and cost savings
Delivering Autonomic Capability

Business Policy

Autonomic Core Capabilities

Autonomic Product Features and Enablers

TotalStorage™

WebSphere™ software

Rational™ software

DB2® Data Management Software

Tivoli® software

Lotus® software

ThinkVision

ThinkPad

ThinkCentre

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The journey has started......

- Products, services available today
- Architecture and core technologies emerging
- IBM is working with business partners and standards organizations to develop open standards for self-managing systems
- Broad IT industry participation is needed – this is an industry-wide initiative
- **Innovation is required!! Aggressive research is essential!!**

Freeing people to focus on their business instead of their infrastructure
Thank you !!!