

PDA: A Tool for Automated Problem Determination

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OVERVIEW

- **Motivation**
- Solution Approach
- Problem Characterization
- High Level Design of PDA
- Problem Determination Experiences with PDA
- Strength & Weakness

MOTIVATION

- Problem management process – complicated
 - Problem Report -> **Diagnosis** -> Solution
- Proposed & developed an automated tool for System Administrators
 - Problem Determination Advisor (PDA)
- Why?
 - Reduction in the time & effort




SOLUTION APPROACH


- Problem characterization
- Automated tool for problem diagnosis



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 - Information Collection
 - Observations
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PROBLEM CHARACTERIZATION

- Only 1 phase: Information Collection
 - Input: Problem tickets
 - Sources of information
 - Contains – problem description, name of the affected system, timestamp, severity, identity of the System Admin handling the request etc.
 - Goal: Derive statistical characteristics
 - Which application?
 - What are the most common causes?
 - Is it an application or OS level issue?
 - How much time spent in resolving?
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INFORMATION COLLECTED

- Product information:
 - Name: Windows
 - Component: Explorer
 - Module: Navigation, move/copy files, search
- Ticket type:
 - Ex. **Error / Performance** / Info
- Cause code:
 - Useful when component and modules are not specific.




OBSERVATIONS


- Most of the tickets arise from a few products
- Within each product, most of the problems come from a few modules
- OS tickets are not as prominent
 - Exception: Windows related tickets comprise 11% of all tickets
 - However, most difficult and require significant effort to diagnose
 - Interesting: Unix related tickets require most effort and time
- Focus of PDA:
 - OS problems on UNIX platform



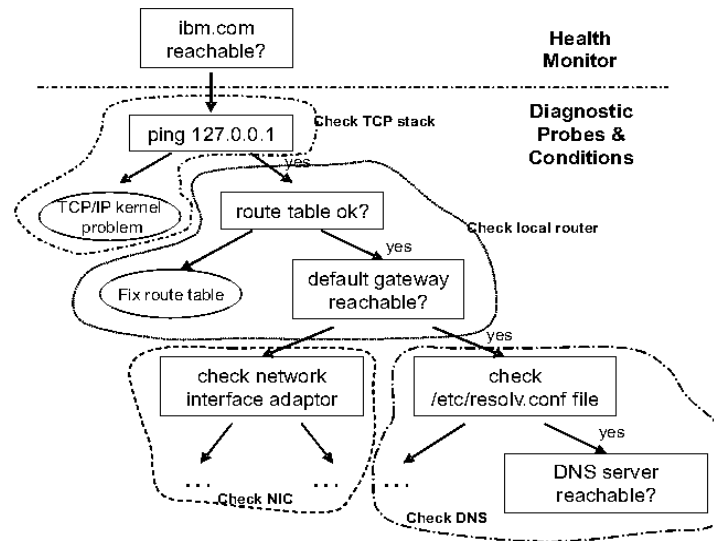
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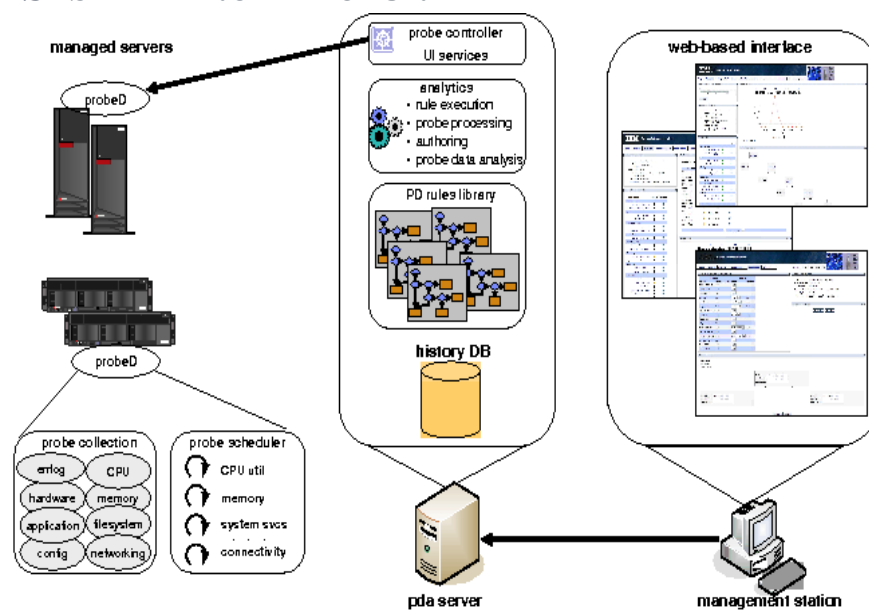
HIGH LEVEL DESIGN OF PDA

- Two level approach:
 - Level 1: Periodic subsystem health monitoring
 - Level 2: Exhaustive Probing
 - Probing:
 - Detailed diagnostic probes when a problem is detected
 - Problem determination rules with decision tree based structures
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EXAMPLE



SYSTEM ARCHITECTURE



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INTERESTING EXPERIENCES WITH DIFFERENT PROBLEMS


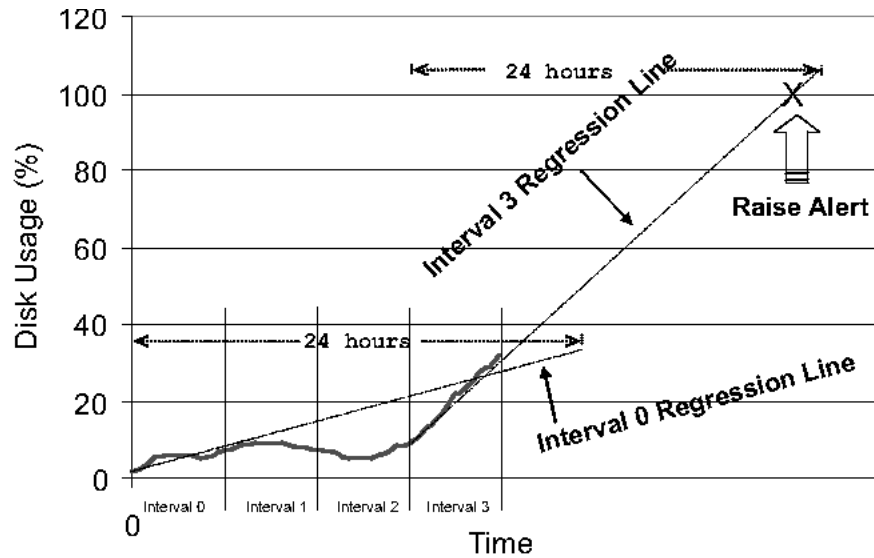
- NFS Problems:
 - Finding root cause can take a significant amount of time
 - Intuitive rules for checking liveness of NFS service daemons
 - Observation: Majority of the problems can be addressed by the simpler checks.
 - **Automation improves efficiency**
 - Storage Problems:
 - 90% of the problems related to storage problems were capacity related issues
 - Low overhead profiler for early detection and mitigation of such problems
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ILLUSTRATION OF STORAGE PROBLEM



CONT..

- Application problems:
 - Application: SendMail
 - Complicated setup process
 - Observation : most of the problems were caused by very simple reasons

STRENGTH & WEAKNESSES

○ Strength

- Real life problem tickets
- A large working prototype
- An extensible architecture
- PDA works on real problems

○ Weakness

- No graph showing the efficiency of the system in terms of how fast a problem was diagnosed by PDA vs that by a human System Admin.
- Not much detail of how to categorized problems using tickets. Was it an automated system or manual?



THANK YOU

