

# Java™ Application Performance Troubleshooting And Tuning



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# Overall Goal

Lower the cost of your Java application:

- More scalable
- More throughput
- Consistent response times

How:

- Identify and fix performance problems

# Learning Objectives

By the end of this class you will be able to:

- Solve Java performance problems
- Approach problems with a repeatable process
- Identify the types of tools that you need
- Use the tools to analyze your problem
- Recognize patterns indicating performance problems in the output from the tools
- Isolate the problem or problems
- Learn to make only one change at a time when tuning
- Successfully fix your problem

# Tactical Objectives

## Experience with Java and its environment:

- Approach performance tuning in a methodical manner
- Use tools to gather data on performance
  - Visualization of performance
    - High level to low level
  - Pattern recognition
- Understand areas in Java that affect performance
- Use best practices learned from performance tuning case studies
- Experience investigating and solving problems

# Agenda : Day 1

- Introduction
- Terminology, HotSpot JVM and Runtime Compiler
- Methodology for Problem Diagnosis
- Memory Management
- Lab 1 – Tools and Diagnosis
- Memory Leaks
- Threads, Monitors, and Contention
- Lab 2 – Analyze a Performance Problem

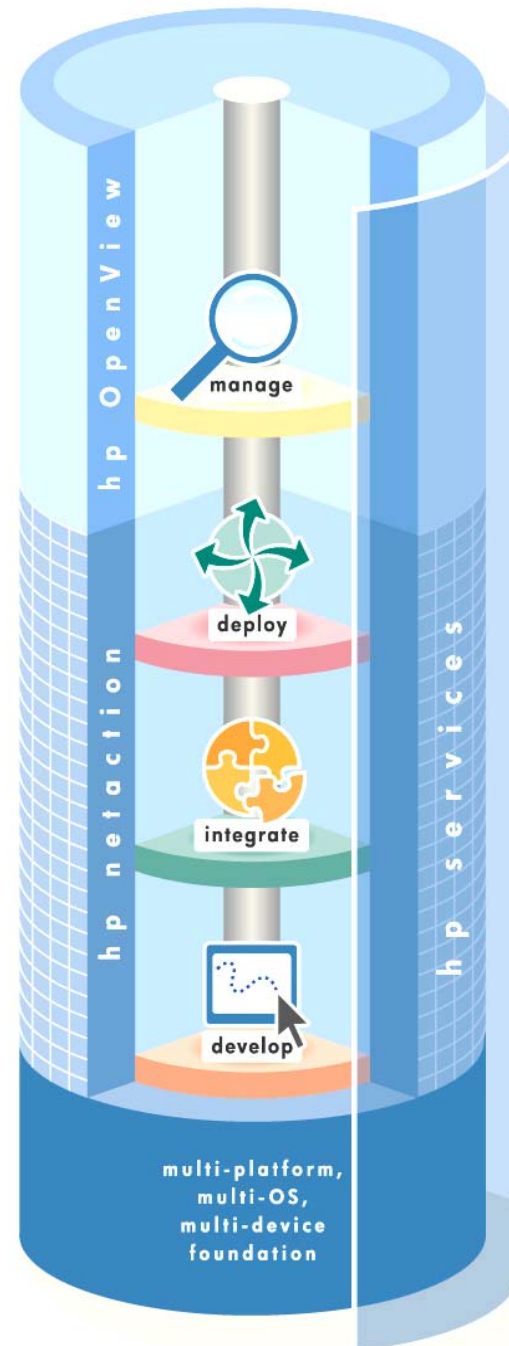
## Agenda : Day 2

- Case Study
- Lab 3 – Analyze Performance of an Application
- The Tools and their Most Common Applications to Finding Problems
- Benchmarks
- Lab 4 – Benchmark Performance Analysis
- Sitraka Tools – JProbe, Threadalyzer, Coverage

# HP is Java – Java is HP

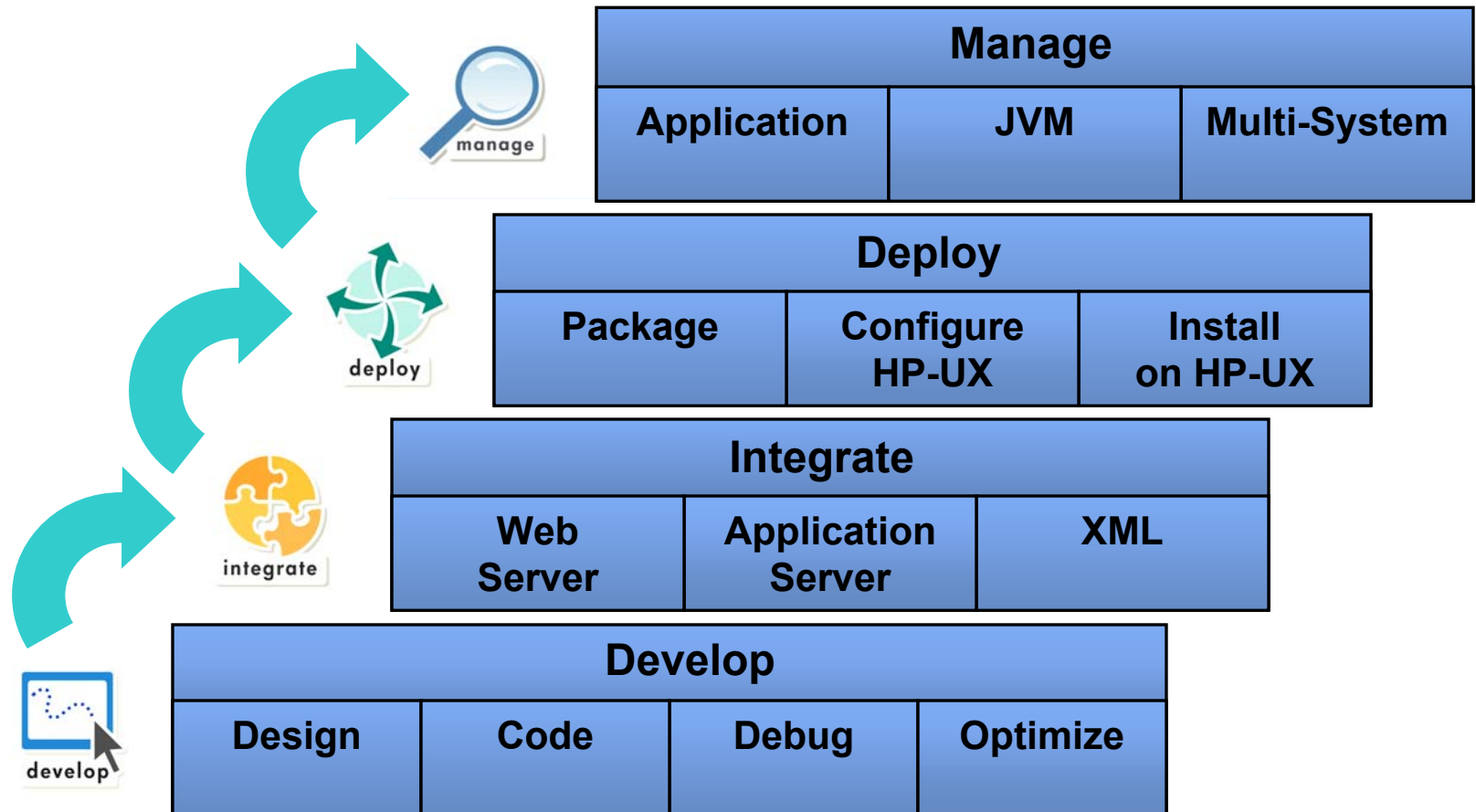
- Best environment for Java
  - Support for the **entire application environment**
    - Develop, Integrate, Deploy, Manage
- Best performance on Unix
- HotSpot Java Virtual Machine
  - HP first to release a production version on Unix
- HP Products
  - HP uses Java on HP-UX in its own products
- HP is defining the future direction of Java
  - Leading efforts for Java Web Services

# Java on HP-UX



# Java on HP-UX

## From Ideas to the Data Center



# HP Products and Java

- OpenView ITO – All levels of system management
  - Smart Plug-in (SPI) for Java Management Extensions (JMX)
- Bluestone Product Suite
  - Application server
  - J2EE/EJB, JSP, XML, ...
  - Mobile developer tools
- Smart Internet Usage
  - Internet monitoring and metering
- Java performance and configuration tools
  - HPjmeter and HPjconfig
- Management Tools
  - High Availability Management Tools
  - HP Surestore Virtual Array Command View Software Device Manager (SDM)

# HP: Defining Java's Future Direction

- Driving industry standards
- Participation in over a dozen industry standards groups
- Participation/authorship of more than 20 Java Specification Reviews (JSR)

# HP and Java Specification Reviews

- 133 Java Memory Model and Thread Spec
- 115 Java Authorization Service Provider Contract for Containers
- 114 JDBC Rowset Implementation
- 111 **Java Services Framework (lead)**
- 109 Implementing Enterprise Web Services
- 107 JCACHE - Java Temporary Caching
- 101 Java APIs for XML RPC
- 99 Java Spec Participation Agreement
- 96 Java Daemons
- 95 J2EE Activity Service for Extended Transactions
- 94 Java Rule Engine
- 93 Java API for XML Registry
- 87 Java Agent Services

# HP and Java Specification Reviews

- 76 RMI Security for J2SE
- 72 Java GSS API
- 67 Java API for XML Messaging 1.0
- 58 J2EE 1.3 Spec
- 56 Java Network Launching Protocol
- 55 Certification Path API
- 54 JDBC 3.0
- 53 Servlet 2.3 and JSP 1.2
- 52 Standard TAG library for Java Server Pages
- 48 WBEM Services
- 31 XML Data Binding
- 28 Java SASL Spec
- 19 EJB 2.0
  - 5 XML Parsing
  - 4 EC Perf Benchmark

# Summary

- HP is Java - Java is HP
- Java on HP-UX spans:
  - From your initial ideas about an application
  - Through application development and deployment
  - To management in the Data Center
- Performance and correctness is our focus
- Tools enable you to lower your costs
  - We are here to learn how to use these tools