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Java Tracer

Introduction

- To come up with a javatracer CLI and/or UI built on top of btrace for tracing events and actions in a targetted JVM. The tool should preferably be a web based tool (built using Applet).

Prerequisite

- The tracer will work only with jdk1.6 and above

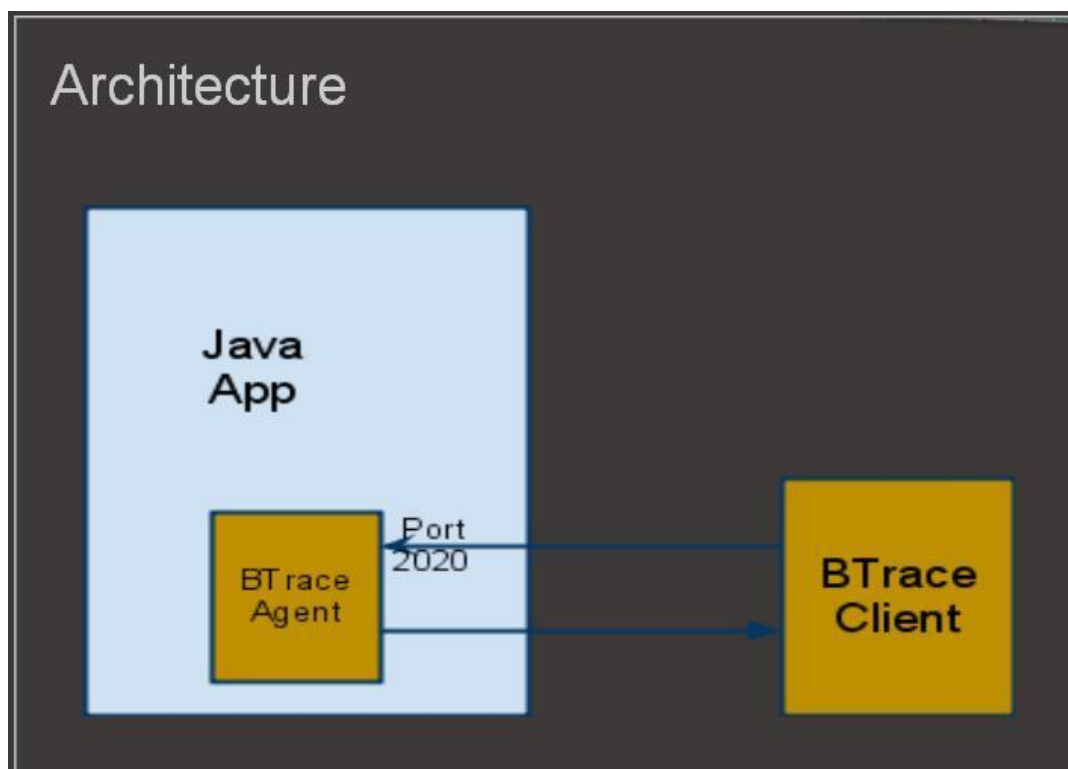
How does it work ?

- The tool will list all JVMs running on a system and will provide an ability to attach to a selected JVM and start tracing the desired events and actions on this VM. The events and actions tracked will be shown on either of CLI or UI tool.
- Working of btrace: Briefly speaking, btrace works by instrumenting the byte code of the target VM on the fly.

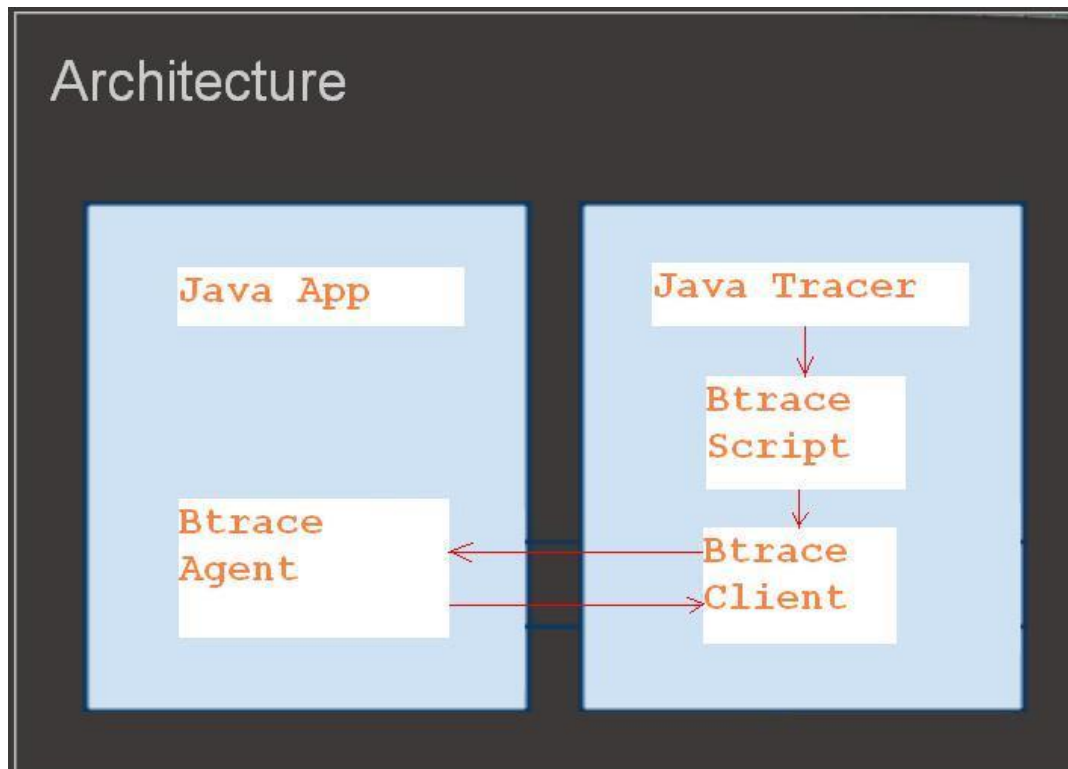
Java technologies used

- Attach API (introduced in jdk1.6) to get list of JVMs and the ability to attach to a selected VM followed by loading an agent
- Btrace (introduced in jdk1.6) script to hook up probe points into the target JVM
- Scripts for launching the tool using command line
- Applet (Swing) for developing the UI tool

Btrace Architecture



JavaTracer Architecture



Why CLI/UI?

- Btrace is a scripting language. Though it uses java mostly, one needs to learn its API and various annotations. Btrace also has several constraints that one needs to know (like use only static variables, no object/array creation allowed etc...)
- CLI wrapper/UI hides the need for learning the language and builds the btrace scripts internally
- CLI wrapper/UI has the ability to track and display several actions and events simultaneously.

Features:

- Following actions to be traced in the CLI/UI
- Ability to attach and detach to/from a VM
- Method level tracing
 - ◆ Tracing constructor of an object
 - ◆ One or more methods in a class
 - ◆ All methods in a class
- Line level tracing
 - ◆ Trace a line in the code
 - ◆ Trace fields (get/set)
- Threads tracing
 - ◆ # of threads created
 - ◆ peak thread count
 - ◆ daemon thread count
 - ◆ current thread being executed (id and name)
- # of IO operation (reads, writes)
 - ◆ files opened
 - ◆ files closed

- ◆ files read
 - ◆ files written (write/append)
 - ◆ distinct files opened
 - ◆ distinct files closed
- # of socket connections
 - ◆ sockets created
 - ◆ sockets closed
 - ◆ # of server socket created
 - ◆ # of client socket accepted
- # of db connections
- Profiling
 - ◆ List of methods invoked in a selected class(es)
 - ◆ # of times each method is invoked
- URL
 - ◆ # of URLs opened
- VM info
 - ◆ free Memory
 - ◆ total Memory
 - ◆ max Memory
 - ◆ heap Usage, non heap Usage
 - ◆ init, committed
 - ◆ finalization count
- Environment info
 - ◆ getenv
 - ◆ system properties
 - ◆ vm arguments
 - ◆ start time, up time, version
 - ◆ available processors
 - ◆ pid
- WebService Tracker
 - ◆ Print class and method name everytime a webservice is called
 - ◆ Time taken by webservice method
- Exceptions
 - ◆ Track # of exceptions/errors thrown
- Class Loader
 - ◆ Print stack trace whenever a class is loaded by system/customer classloader
 - ◆ Print stack trace whenever a class is unloaded by custom classloader

Tasks

Tasks	Owner	Status/Comments
Getting list of vm ids		
Wrapper script		
Btrace scripts		
Reporter		
Adding listeners for each trace		

- Notes
 - ◆ Reporter needs to be a common class that will be used by btrace scripts for consistent reporting format
 - ◆ Reporter to support both text and xml formats
 - ◆ Wrapper script will provide command line arguments for selecting various trace events and pids

Features:

- ◆ Wrapper script will also provide argument for specifying intervals in which events need to be traced

Btrace_Tasks

Category	Owner	Status/Comments
Method level tracing		
Line level tracing		
Threads tracing		
Profiling		
VMinfo		
Environment Info		
WebService Tracker		
# of IO operation (reads, writes)		
# of socket connections		
# of db connections		
URL		
Exceptions		
ClassLoader		

JavaTracer Plugin

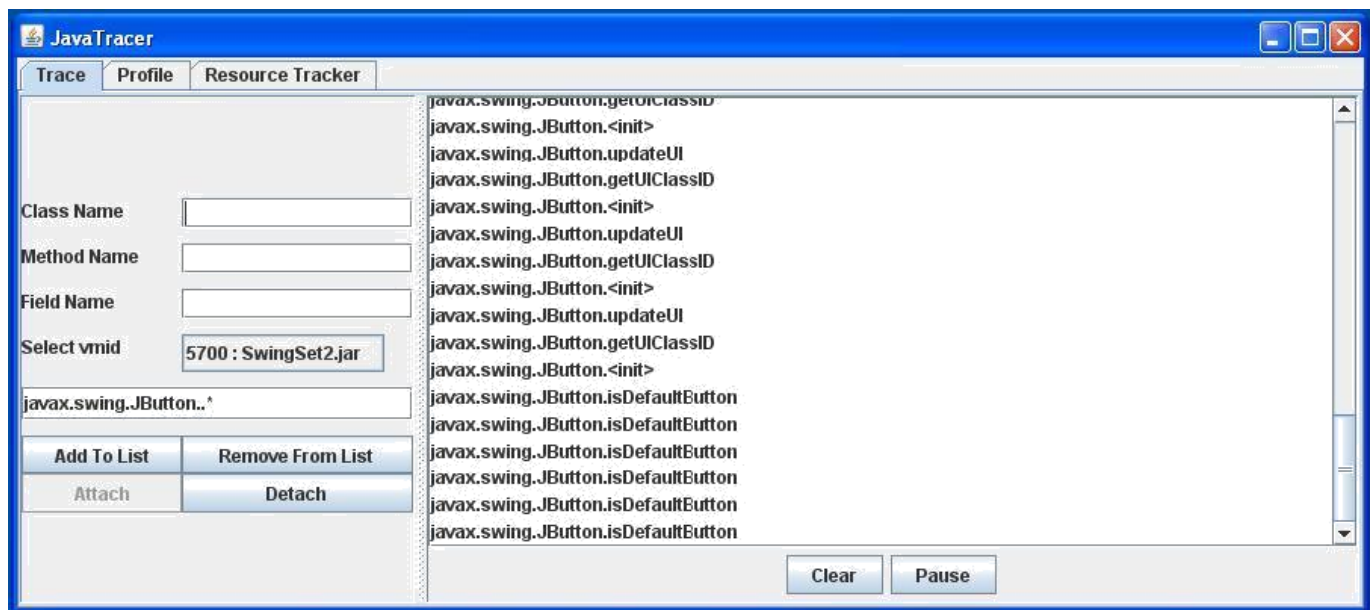
JavaTracer Plugin

Issue Tracker

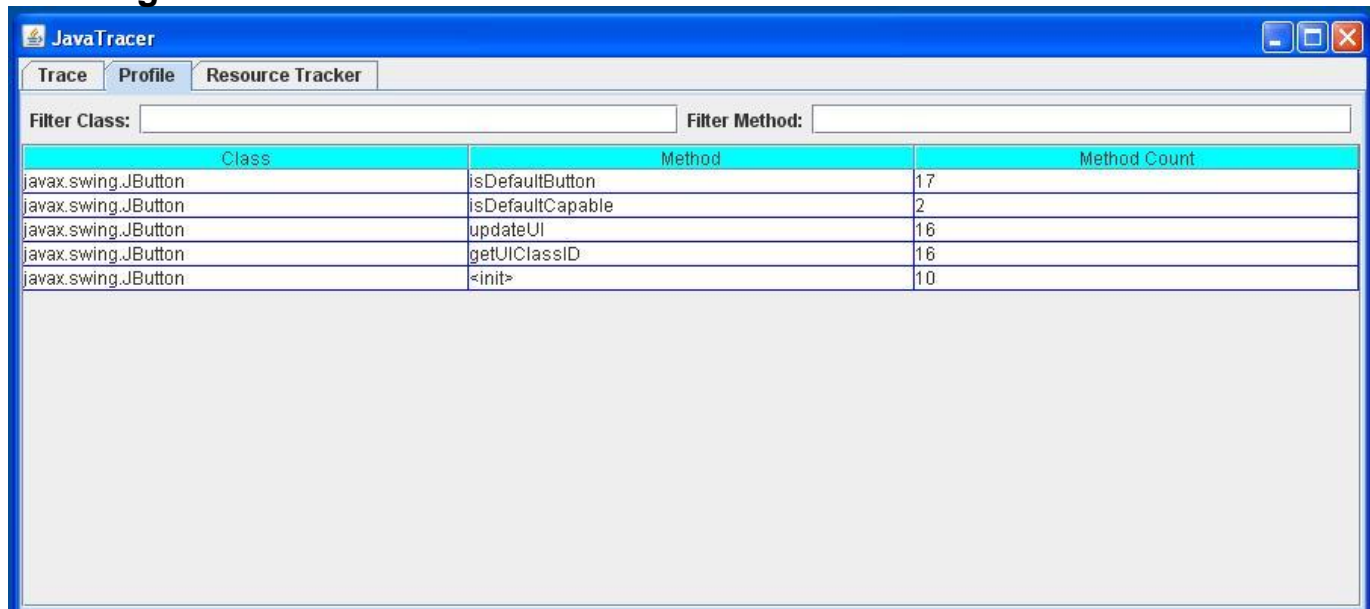
Issue	Raised By	Solution	Solution By
Not able to execute multiple btrace scripts (separate java scripts)		Creating single btrace script at runtime for all events.	

Sample Snapshots

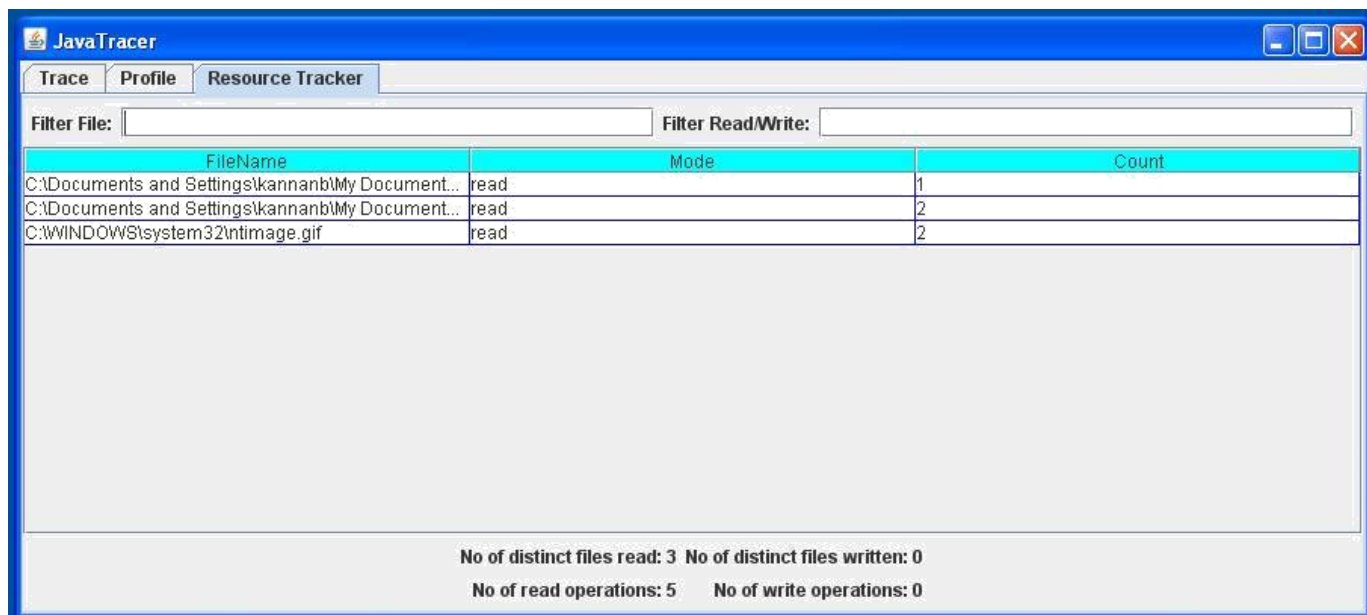
Method Tracing



Profiling



Resource Tracker



Logging

- Ability to log tracked data (actions and events) to a file
- Ability to create image snapshot of some parts of the UI tool (like profiling, resource tracker etc...)

Reference Documents

- Btrace installation
- Btrace user's guide
- Btrace slides

-- Kannanb -- 16 Jul 2009

► Attachments

▼ Attachments

Topic attachments

I	Attachment	Action	Size	Date	Who	Comment
	JavaTracer1.JPG	manage	57.3 K	16 Jul 2009 - 15:56 UTC	Kannanb	
	JavaTracer2.JPG	manage	1070.0 K	16 Jul 2009 - 16:06 UTC	Kannanb	
	JavaTracer3.JPG	manage	47.5 K	16 Jul 2009 - 16:08 UTC	Kannanb	
	Btrace1.JPG	manage	23.4 K	16 Jul 2009 - 17:32 UTC	Kannanb	
	JavaTracerArch.JPG	manage	29.2 K	16 Jul 2009 - 17:55 UTC	Kannanb	

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Topic revision: r5 - 16 Dec 2009 - 04:01:52 -

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