COMPARING MONITORING SOLUTIONS FOR CF AND LUCEE

Charlie Arehart

Independent Consultant/Server Troubleshooter

(CArehart.org, @carehart)

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A DAY IN THE LIFE

WHO MIGHT YOU BE?

WHO AM I?

CHALLENGE: CHOOSING THE RIGHT TOOLS

COMMON PROBLEMS

LESS COMMON PROBLEMS

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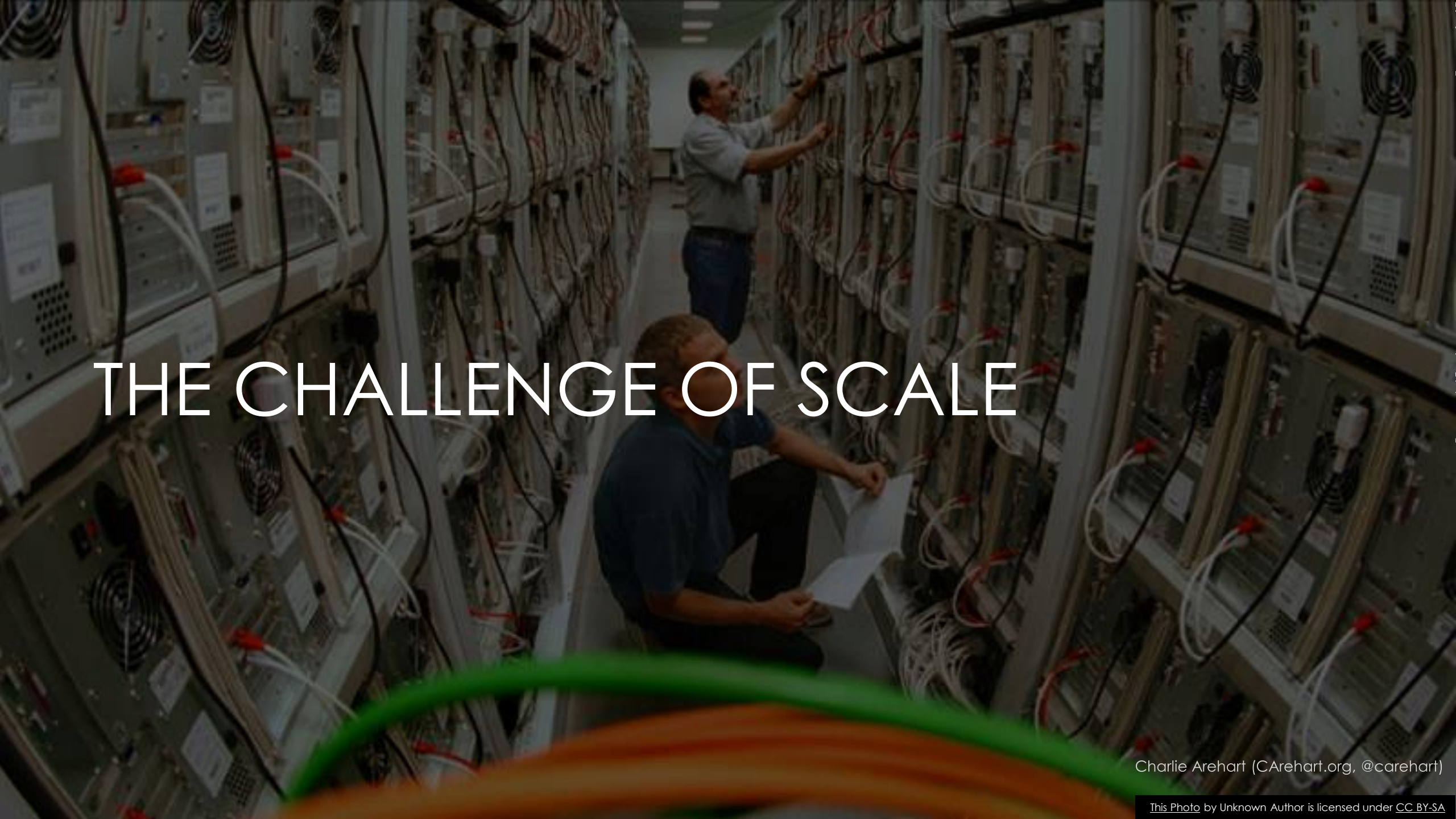
- Problems on any related services (db, api calls, cache, etc.)
- CPU, Memory, Disk, Network issues on box but not due to CF/Lucee
- Special issues with VMs
  - Issues on the VM host
  - Issues with other VMs within host
- What about many server, vm's, cloud? …

ISSUES OUTSIDE OF CF/LUCEE



THE CHALLENGE OF SCALE

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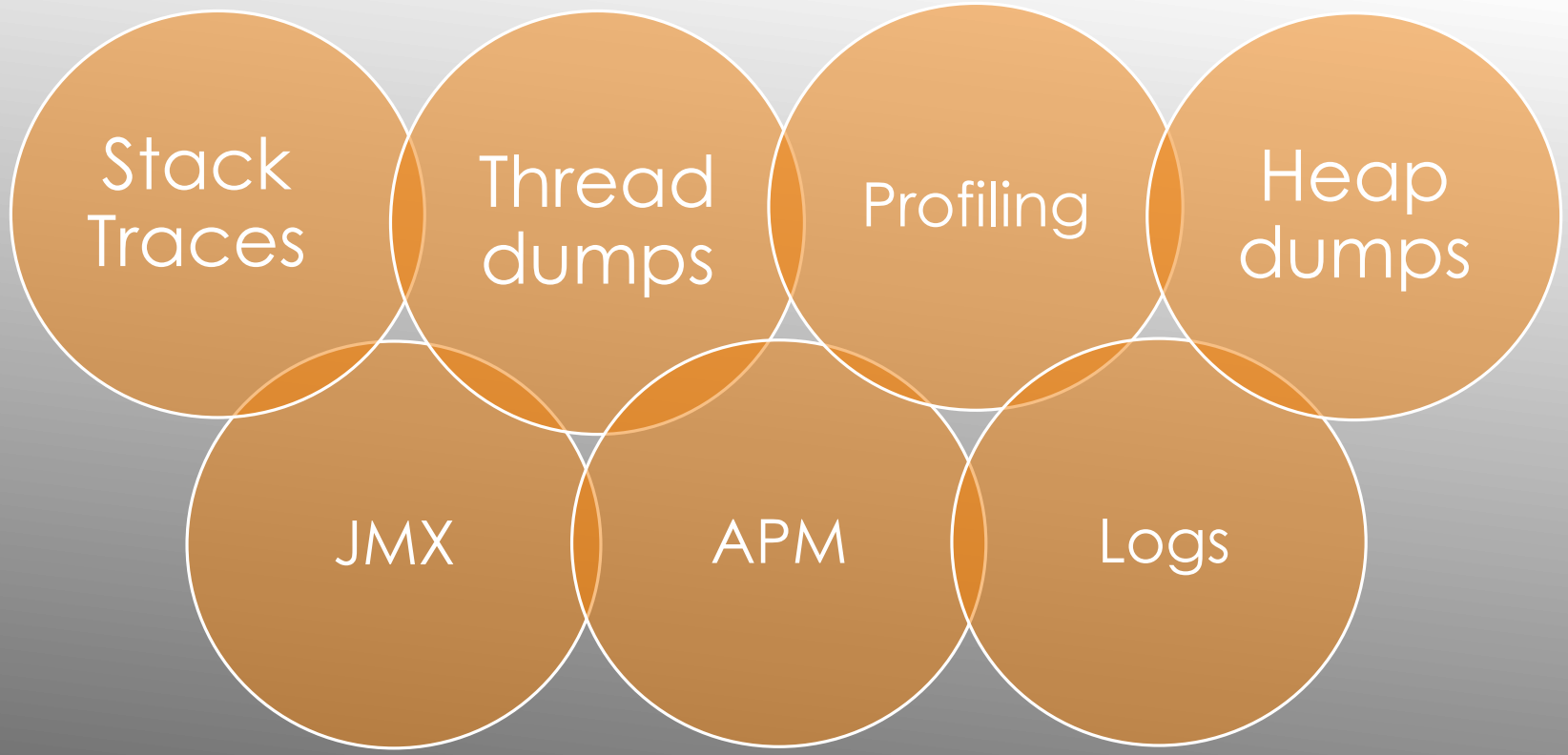
- CF and Lucee are of course based on Java
  - And both run on Tomcat by default
- Some people come to troubleshooting them with Java experience
  - Or find resources on the web proposing such approaches
- Let's consider first some of them…

SOME APPROACH CF/LUCEE TROUBLE WITH JAVA PERSPECTIVE



COMMON JAVA TROUBLESHOOTING APPROACHES

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JAVA/TOMCAT TROUBLESHOOTING TOOLS

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CF/LUCEE TROUBLESHOOTING TOOLS

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STILL OTHER TROUBLESHOOTING TOOLS

- Did you know of all these? Do you turn to them?
- What can all these tools do? What can they not? Which should you use?
  - Simply no time to show them all
  - Each could deserve an hour
- Focus will be on different monitoring/troubleshooting approaches
  - And which tools can (or cannot) do them
  - To help you decide which you can/should use

SO MANY TOOLS, SO LITTLE TIME

- Both are rudimentary, but better than nothing
- Logs generally don't help much in a "monitoring" sense
  - Some may help with understanding what happened prior to a crash
- Debug output helpful for understanding a given request
  - Not enabled in production typically, so not helpful for such trouble

LOGS AND DEBUG OUTPUT

OS PROCESS MONITORING

- Most people naturally gravitate to these when stuff hits the fan:
  - Task manager in Windows (or perhaps Process Explorer, other alternatives)
  - Top, htop, ps commands in Linux (and other alternatives)
  - Activity Monitor in MacOS
- These to at least give high-level OS and process-level metrics
  - Again better than nothing, and often useful
- Sometimes misleading, especially about memory "used by" CF/Lucee
  - Usually we need to see "inside of" CF/Lucee…

CF/LUCEE ADMINS

- CF Admin offers little in terms of monitoring/troubleshooting
- Lucee Admin Overview page shows heap, cpu graphs
  - Also counts of scope use
  - Counts of requests running/queued/threads, dsn connections
- Even such basic metrics can be quite valuable
  - But what if you don't run Lucee?...

- CFSTAT- cmdline tool in cfusion/bin
- GetMetricData() CFML function (also in Lucee)
- Perfmon – CF's integration with this Windows tool
- CF Metrics logs
  - CF10>: "metrics log" feature, enabled in CF admin
  - CF9<: jrun metrics, enabled in jrun.xml

CF TOOLS FOR BASIC METRICS

- The previous tools could at least better clarify IF there is a problem in CF/Lucee
  - But they don't help much to know really WHAT the problem is
  - Or WHAT requests are running, for how long, from who, and why slow
- For that, we needed better tools
  - Preferably with a CF/Lucee focus, and there have been a few over the years, as we will see
  - But many again instead fall into using Java tools. Let's take a look at several

BASIC METRICS ARE THAT, BASIC

TOMCAT MANAGER

- Manager available but **not enabled** by default
  - And not easily enabled with CF
  - Take care to consider documented **security concerns** with enabling it
- Monitoring-oriented features:
  - Shows server status, can see session counts, memory usage; trigger thread dumps
- More: *https://tomcat.apache.org/tomcat-9.0-doc/manager-howto.html*

JVM TOOLS

- Tools provided in JDK only (not JRE)
  - Some only as of a certain JVM version (added/removed)
  - Often most easily used if JMX remoting enabled
- jvisualvm / visualvm
  - Removed from JDK as of Java 9, now at *https://visualvm.github.io*
- Java Mission Control / jmc
  - Was originally only available to Java licensees, then open sourced (still beta)
  - Contains Flight Recorder, JMX console, hprof dump analyzer
  - *https://openjdk.java.net/projects/jmc/*
  - *https://docs.oracle.com/javacomponents/jmc-5-5/jmc-user-guide/toc.htm*

- As well as older cmdline tools, in jdk/bin and lucee/jre/bin …
- On Windows, may need to "run as admin" for some to work
- Jconsole
  - Offers graphical UI about memory, threads, jmb, and more
- And others that are "experimental/unsupported"
  - Jstack: Obtains stack trace of a jvm thread
  - Jmap: Print memory maps or heap memory details
  - Jcmd: Lets you send any of dozens of diagnostic commands to JVM

MORE ON JVM TOOLS

THREAD DUMP TOOLS

- Taking thread dumps
  - Again: VisualVM, Java Mission Control. Tomcat Manager (more ways below)
  - And within most APM tools (as well as FR, SF, CFSM/PMT)
  - jcmd, jstack, kill -3, windows (ctrl+break)
- Analyzing them
  - *http://fastthread.io/*
  - TDA: *https://github.com/irockel/tda*

JVM PROFILERS

- These monitor time spent within or across threads, by java method
- Available in VisualVM and Java Mission Control, as well as:
  - Some APMs (as well as FR, SF, CFSM/PMT)
  - Yourkit: *https://www.yourkit.com/*
  - Jprofiler: *https://www.ej-technologies.com/*
  - Xrebel: *https://xrebel.com/*
  - Netbeans: *https://profiler.netbeans.org*

- Taking heap dumps
  - VisualVM, Java Mission Control, Tomcat Manager
  - jcmd, jmap, jmx, HeapDumpOnOutOfMemoryError
  - And most APM tools (including FR, PMT)
- Analyzing them
  - Eclipse memory analyzer tool (*https://eclipse.org/mat/)*
  - Jhat (removed since Java 8)
  - *https://heaphero.io*
  - *https://go.nastel.com/autopilot-heap-detective*

MEMORY/HEAP ANALYSIS TOOLS

- Forcing GCs: jvisualVM, jcmd, most APM tools (and FR, SF, CFSM/PMT)
- Obtaining GC logs: -XX:+PrintGCDetails and related args
- Tools to analyze GC logs
  - *http://gceasy.io/*
  - *https://gcplot.com*
  - *And others*

GC TOOLS

JMX TOOLS

- jmx: java mgt extensions
  - Many java apps, including Tomcat, expose metrics via jmx
- Tools to view them include: jvisualVM, Tomcat Manager
- jmc, jconsole
- Some APM tools (including FR)
- *https://jolokia.org/*

NOW ON TO CF/LUCEE MONITORS

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CF ENTERPRISE SERVER MONITOR

- Came with CF8-2016, Enterprise only
  - Launched from CF Admin (Monitoring menu)
- Many ignored, dismissed, or reviled it
  - But it did at least offer several basic metrics "for free" (no overhead)
  - Or could monitor still more, with 3 "Start" buttons offered there
  - Let's take a look
- Beware: "start memory tracking" could be dangerous, "profiling" less so
  - Was also a Flash interface, which was a negative
- Replaced in CF2018 with …

CF2018 PMT

- New monitoring solution, available in CF2018, Std and Enterprise (and Dev)
  - Tool offers many, many monitoring features
  - See Adobe resources for more on all these, but let's take quick look
- Runs as service separate from CF, with datastore (elasticache) also separate
  - Most should consider running these on box apart from CF box
  - And should consider increasing their heap size
- Beware also that there have been updates to the PMT
  - Must be applied manually. See my blog post on this

- Previous two monitors work only in CF, next two work with CF or Lucee
  - FusionReactor, SeeFusion have been serving folks well for over a decade
- FR is from Intergral, here in Germany, often a sponsor
  - And I've presented many times on it over the years
- Both can show most of what we have seen so far, and more
  - And yes, like CFSM/PMT, both FR/SF are safe for/meant for use in production
- Both products are commercial. See web sites for more

FUSIONREACTOR & SEEFUSION

FUSIONREACTOR & SEEFUSION (CONT.)

- No time to fully demo FR or SF. Dom covered FR in his talk
  - See ~20 recorded FR webinars at fusion-reactor.com/webinars
- But let's take a quick look
- We saw there are many things that FR does that SF and CFSM/PMT do not
  - There are also some things that each other does which FR does not
- I'd love to do a comparison of all 4 tools, but that could be an entire talk!
  - I may do a blog post or series on that

- Lucee folks will ask plainly, how does FR compare to SF?
  - They do have some overlap
  - They do differ in pricing models (again, see their sites)
    - Note that FR does offer a Developer edition at much lower cost than Std edition
  - But put plainly, FR does offer many advantages…

BUT WHICH SHOULD I CHOOSE?

- FR can also be used with any Java application/server
- Offers error history, requests by memory/by app/by status code, and more
- Tracks calls to external services (and DBs without need of wrapping)
- Offers profiling of individual slow requests, automatically
- Offers heap analysis, tracks GC's, memory spaces, class loading, JMX, more
- Can track thread CPU time, profile CPU across all threads on demand, etc.
- Offers feature to handle ephemeral instances, automatically monitor them
- Offers FR cloud, which adds even more capabilities

FR ADVANTAGES OVER SF

WHAT ABOUT APM'S?

OF COURSE, MANY AVAILABLE JAVA APMS

- Appdynamics
- Dynatrace
- NewRelic
- Datadog
- Stackify (prefix and retrace)
- Java Melody
- Plumbr
- Perfino
- Sematext
- Moskito.org
- Hawkular.org
- And FR and others

- Again, no time to demo them
- Beware many have a Java focus, but may still be useful with CF/Lucee
  - Some folks even run such APMs alongside also FR/SF/CFSM/PMT
- But many only know of APMs, miss out on the CF focus of the others
- That said, some do offer to track transactions across multiple services
- Also, some apm's actually offer more than "java apm" features
  - To include options for system monitoring, db monitoring, etc.

BEWARE JAVA FOCUS OF APMS

- Some APM's also track queries within requests, like FR/SF/CFSM/PMT do
  - And may tracking external server call time (like FR, PMT)
- Some APM's offer alerting on trouble (like FR/SF/CFSM/PMT)
- Some monitor from central repository off-server (like FR Cloud, PMT)
- Some APM's offer daily/weekly/monthly reports (like FR)

OTHER APM FEATURES TO WATCH FOR

- Some APM's track sessions build up, perhaps due to spiders/bots (like FR, CFSM, PMT)
  - But Java ones will track only if JEE sessions are used (in CF, Lucee)
- Some track end user response time (network time/browser render time)
  - May offer js code to add to your app (like FR)
- Some offer error tracking (like FR, CFSM, PMT)
  - More on error tracking in a moment

OTHER APM FEATURES TO WATCH FOR (CONT.)

- Interactive step debugging
  - Possible with CF using CFBuilder
  - Possible with CF and Lucee using FR and older FusionDebug
- Code coverage
  - Possible with CF and Lucee using FR, also commandbox extension
- Error tracking
  - FR offers a powerful new event snapshot feature
  - And there are still other error handling tools ….

SOME OTHER TROUBLESHOOTING TOOLS

ERROR TRACKING TOOLS

- CFML-based, open source:
  - BugLogHQ
  - Hoth
  - Irongate
- Generic, free/commercial
  - Airbrake
  - Bugsnag
  - Raygun
  - Sentry

- Several other categories of monitoring tools (at cf411.com/mon)
  - Database/SQL Monitoring Tools
  - Event Log Monitoring
  - SAN or NAS Monitoring Tools
  - System Monitoring Tools
  - VM/Virtualization Monitoring/Mgt Tools
  - Web Server Analytics Tools
  - Web Server Request Monitoring Tools
  - Web Site Uptime Monitoring Tools

FINALLY, IMPORTANT ALSO TO MONITOR OTHER PARTS OF ENVIRONMENT

- We've seen many problems, approaches, tools. Some traditional for Java:
  - Heap dumps, thread dumps GC logs. profiling, jmx
- But often need to see inside CF/CFML processing, which they/APMs don't
  - For CF/Lucee, tools like CFSM/PMT/FR/SF are uniquely suited
  - Some better than others
- Even most basic tools (task mgr/top, cfstat/perfmon, etc.) better than nothing
- Get and use diagnostics. Don't just "restart"! ☺
- If I can answer any questions about my talk, please contact me:
  - charlie@carehart.org
  - @carehart (twitter, linkedin, github, facebook, etc.)

CONCLUSION