Learning Instruments

Profiling your App

Session 409

David M. O'Rourke
Performance Tools Engineering Manager

What You'll Learn Today

What You'll Learn Today

- Elements of performance

What You'll Learn Today

- Elements of performance
- Methodology to improve performance

What You'll Learn Today

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- Methodology to improve performance
- Instruments tour

What You'll Learn Today

- Elements of performance
- Methodology to improve performance
- Instruments tour
- iOS App optimization demonstrations

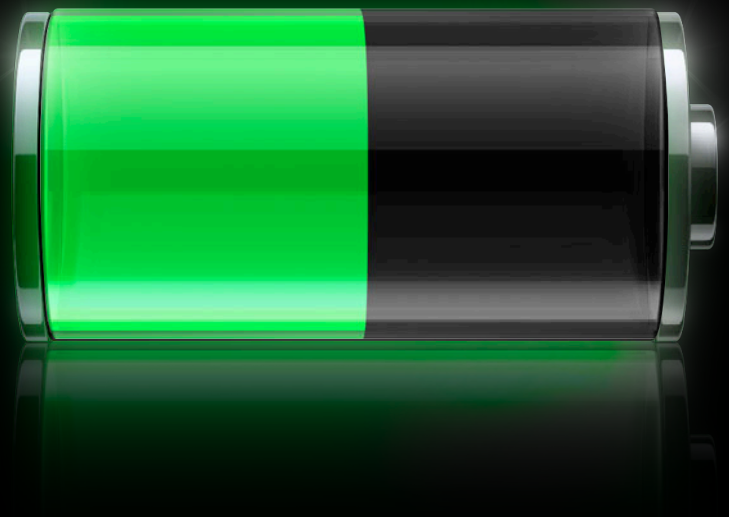
What Is Performance?

Fast

Responsive

Efficient

Power



Power

"Slow and buggy"

"Crashes all the time"

Performance Is a Feature of Your App

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- Xcode to author/build your app

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- Xcode to author/build your app
- Interface Builder to design your app

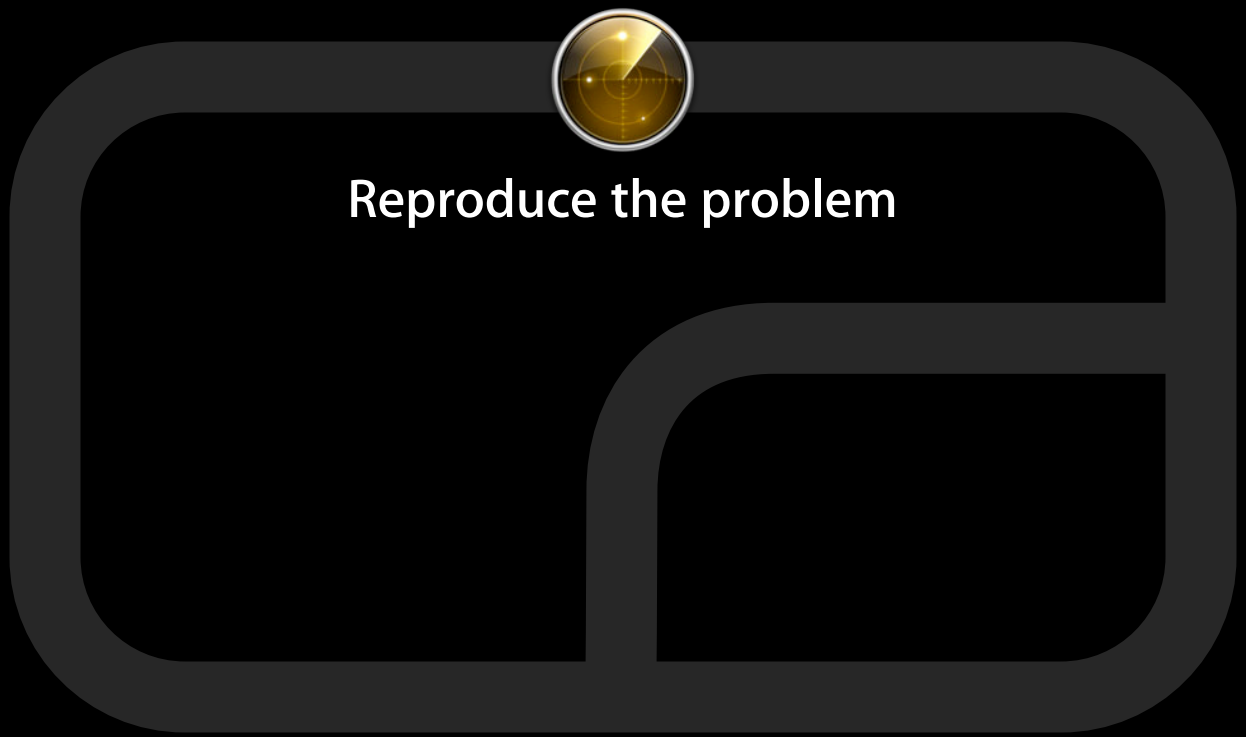
Performance Is a Feature of Your App

- Xcode to author/build your app
- Interface Builder to design your app
- Instruments to profile your app
  - Optimize performance
  - Reduces crashes and terminations
  - Can improve power usage

Performance Profile Process

Debug Process

Debug Process



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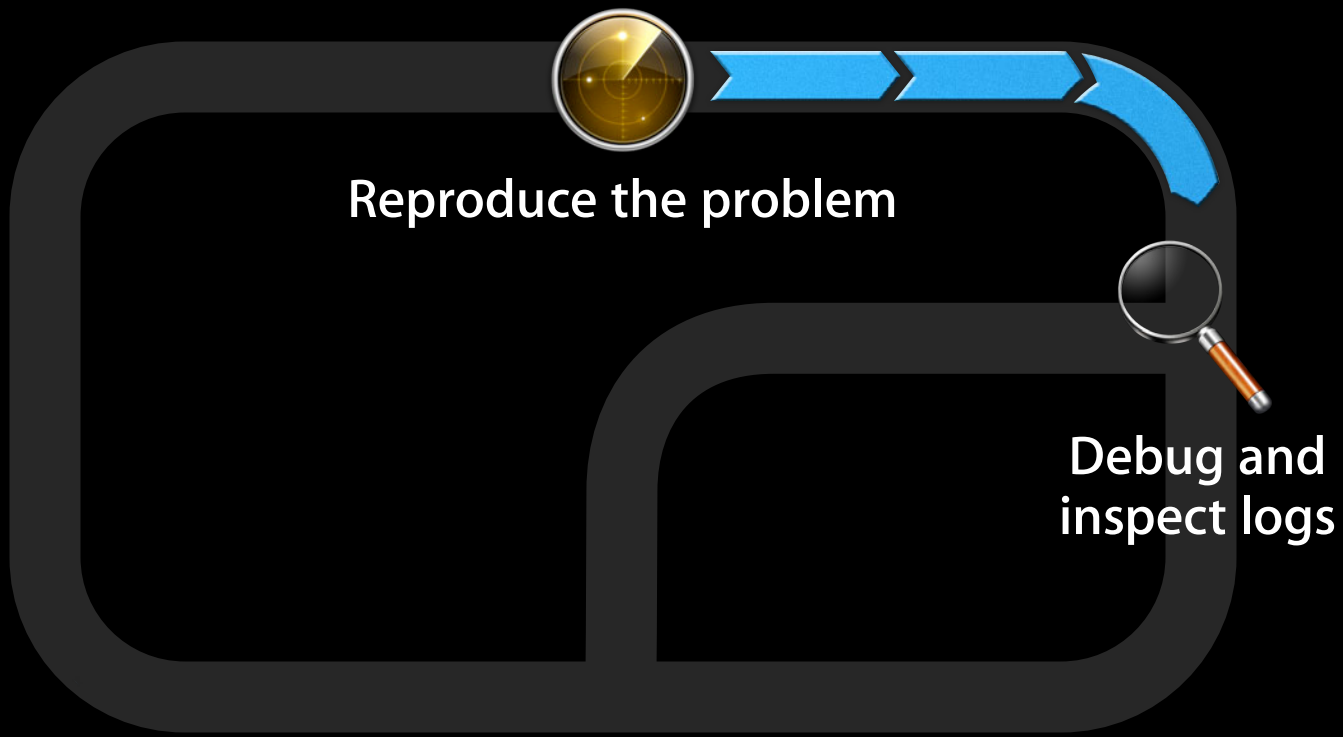

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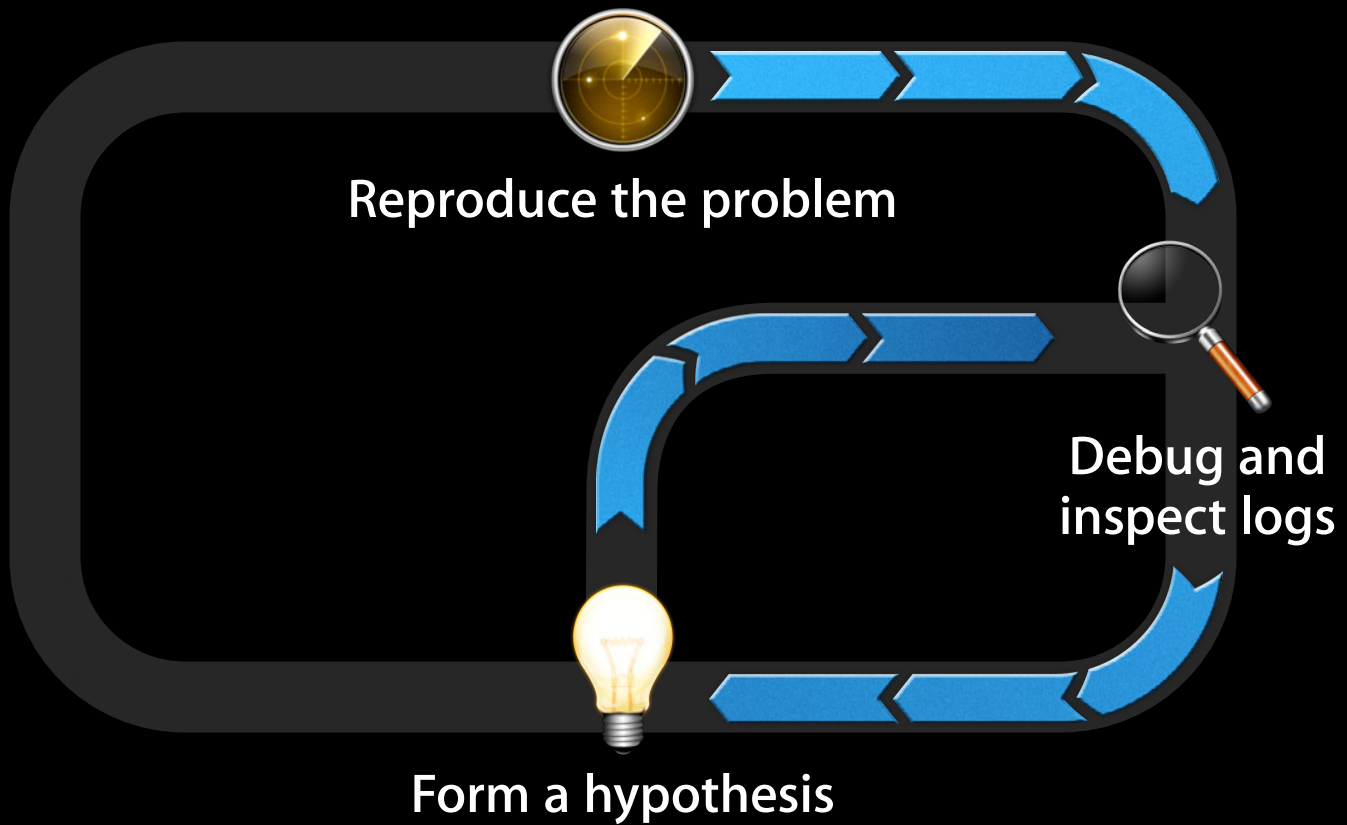

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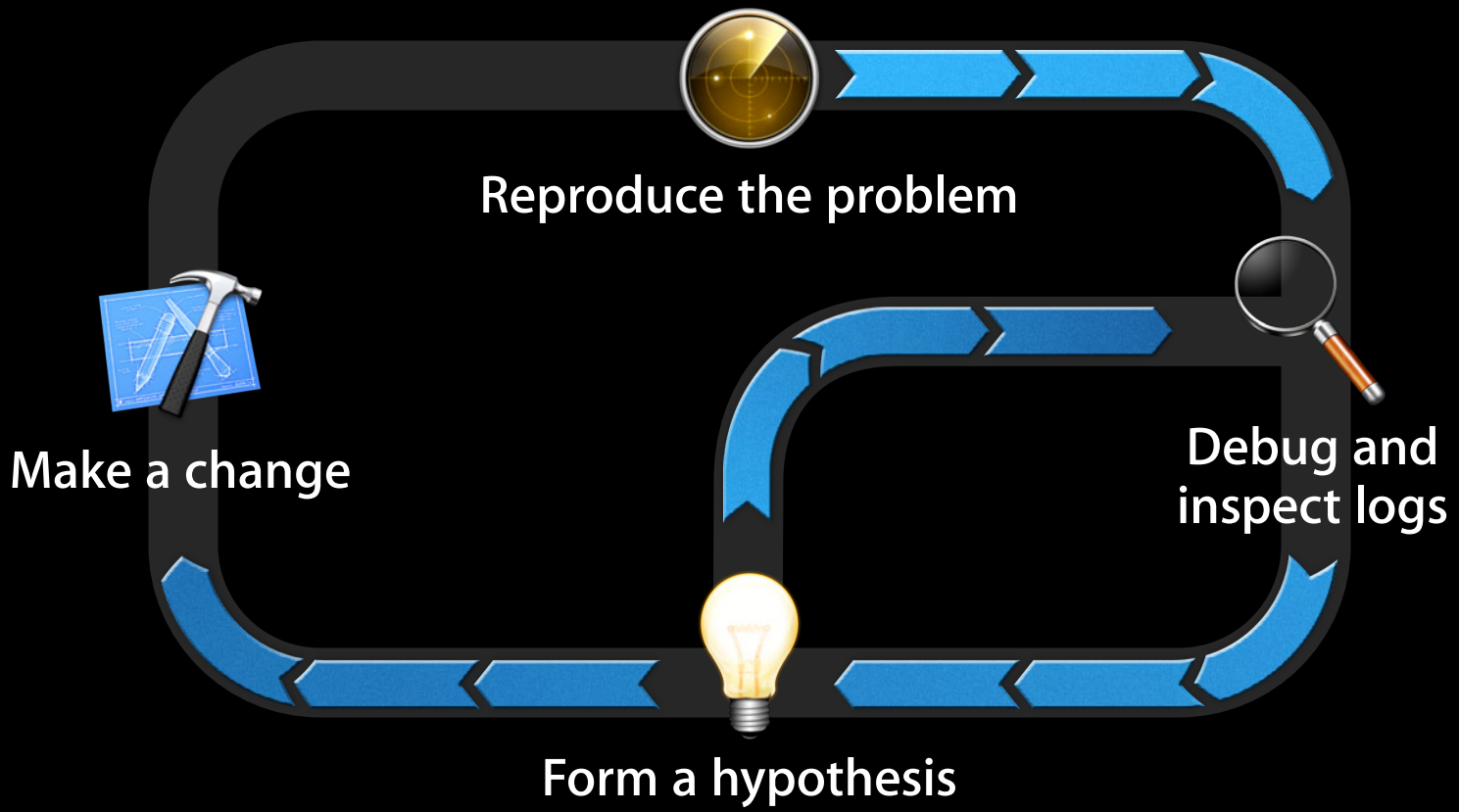

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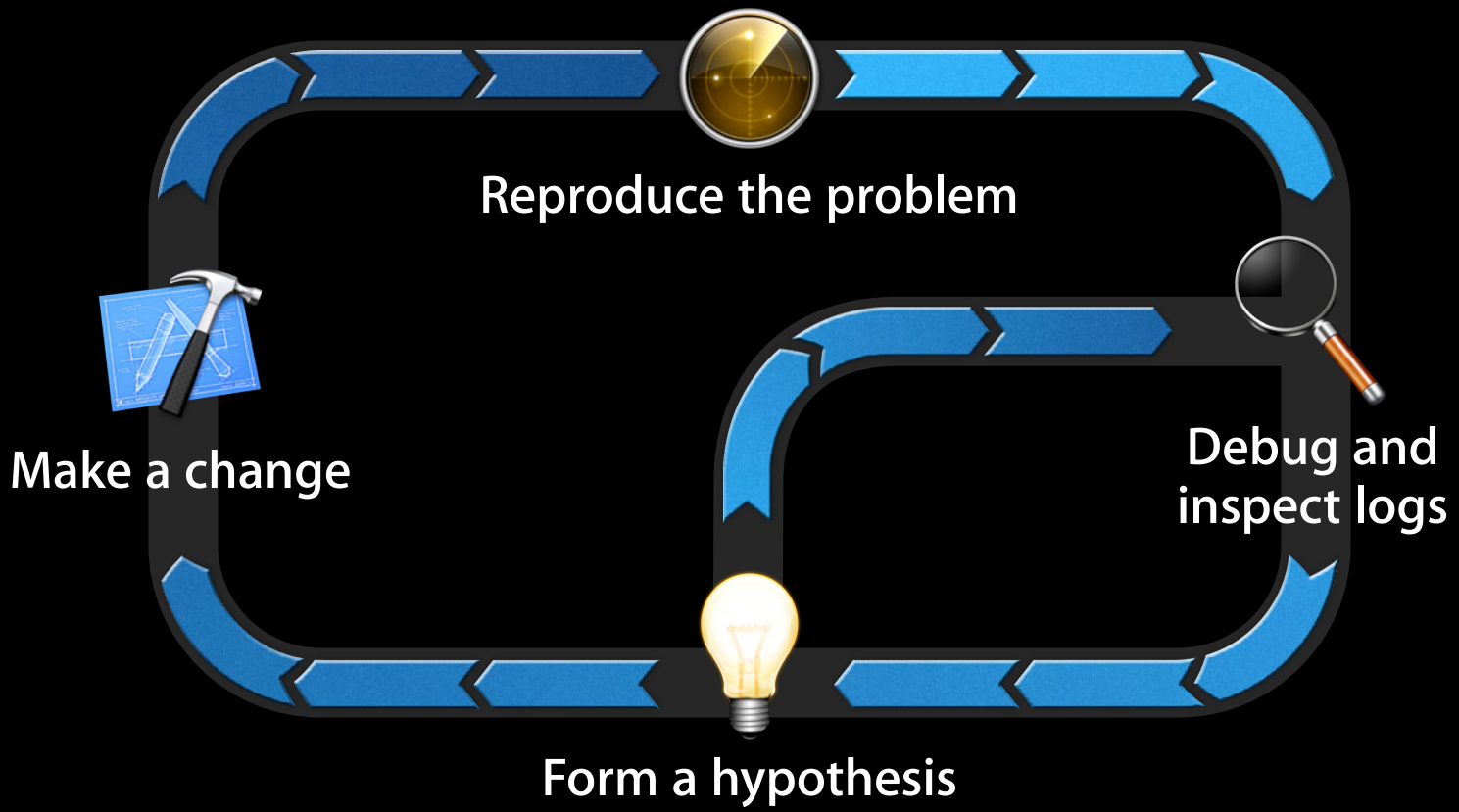
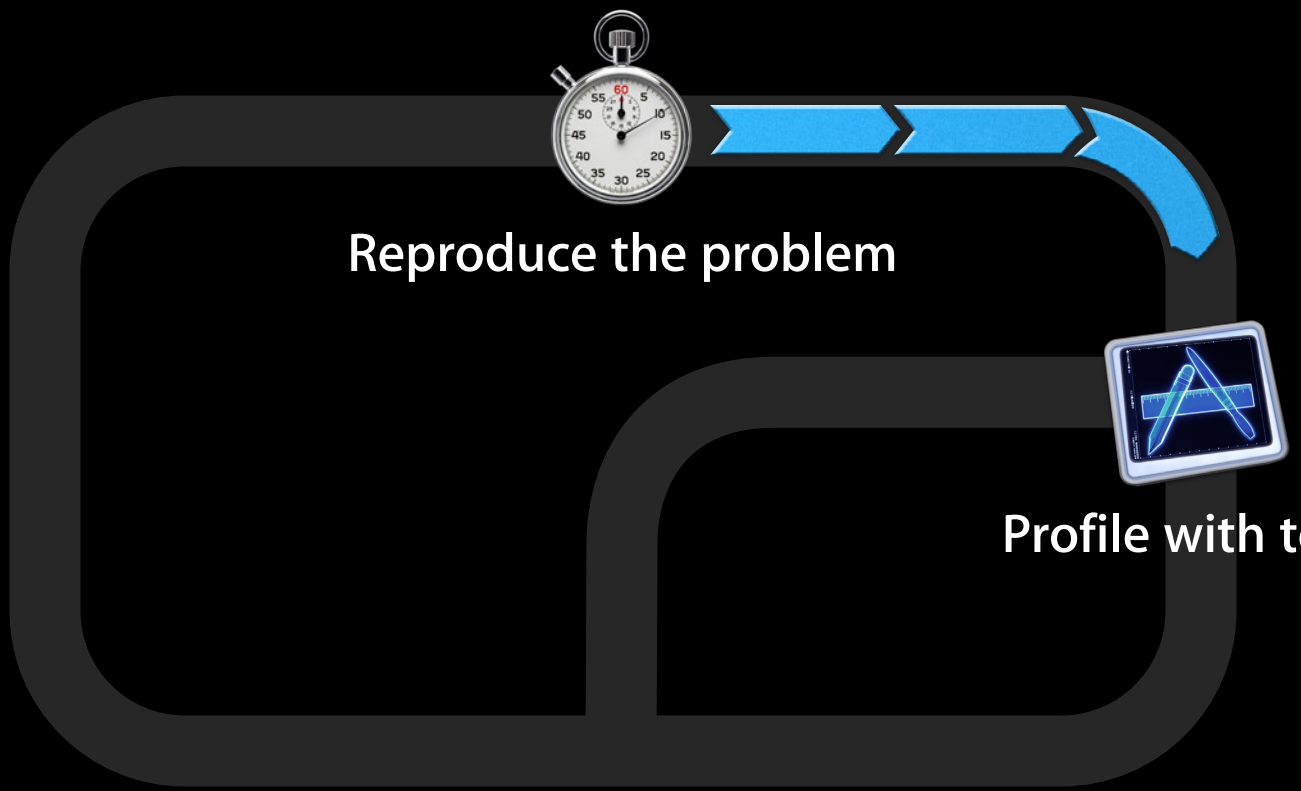


Profile Process

Profile Process

Reproduce the problem

Profile Process



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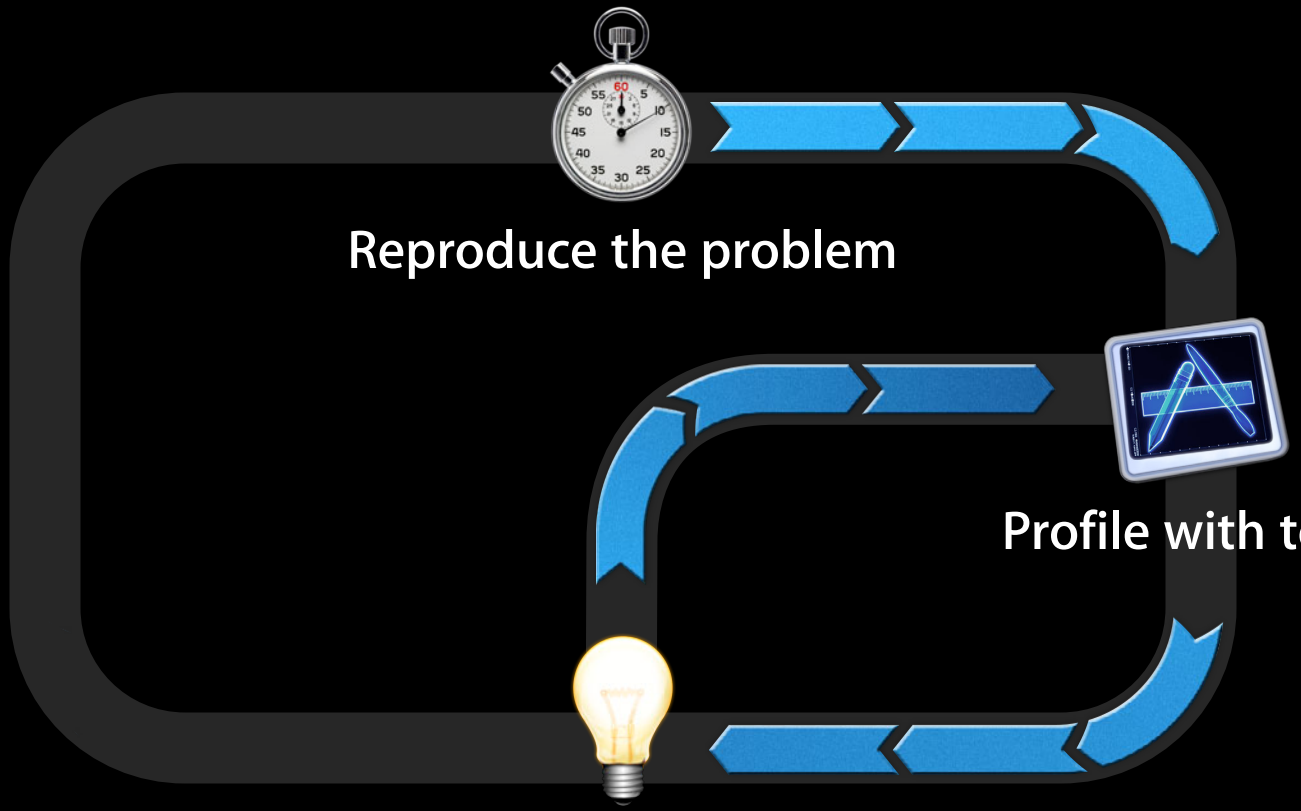

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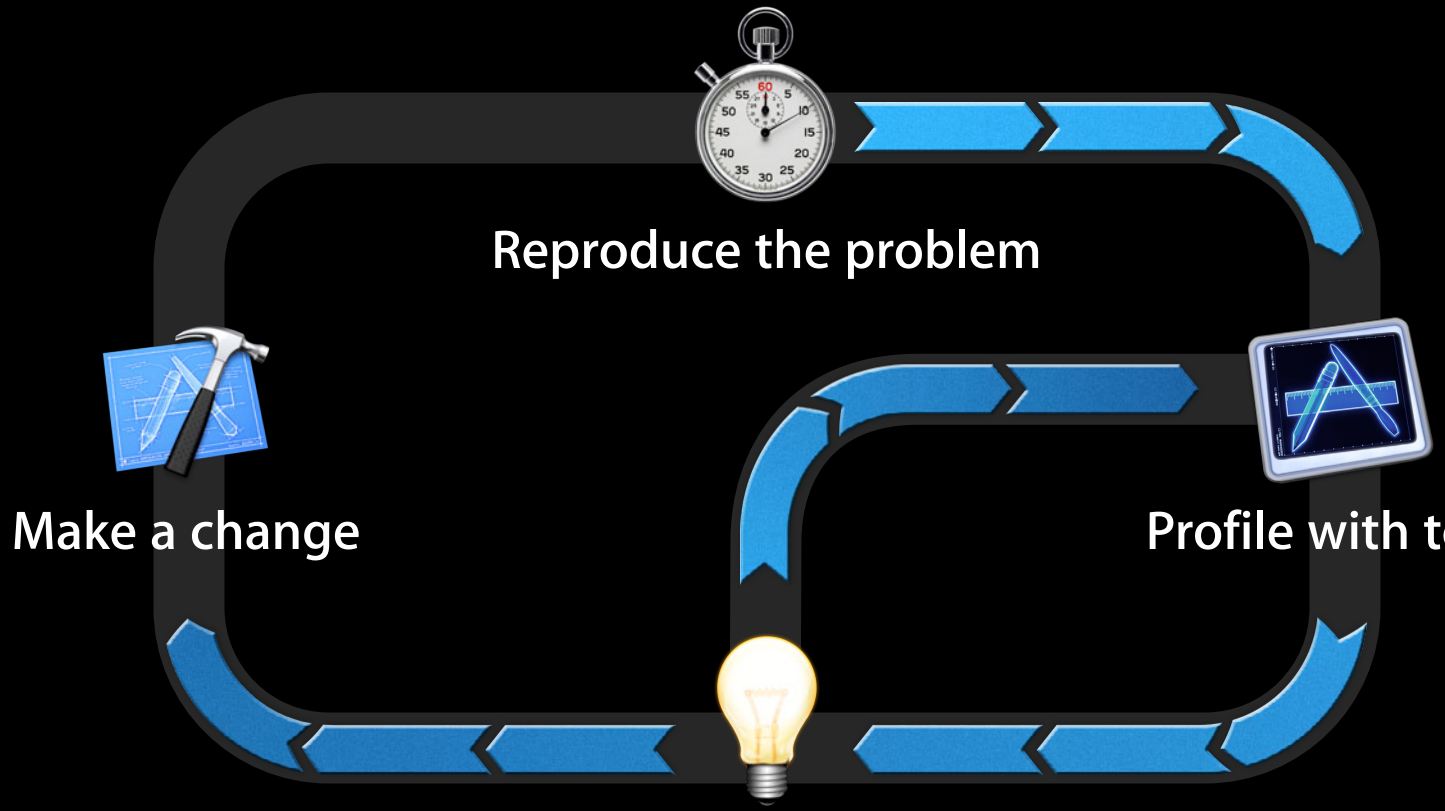

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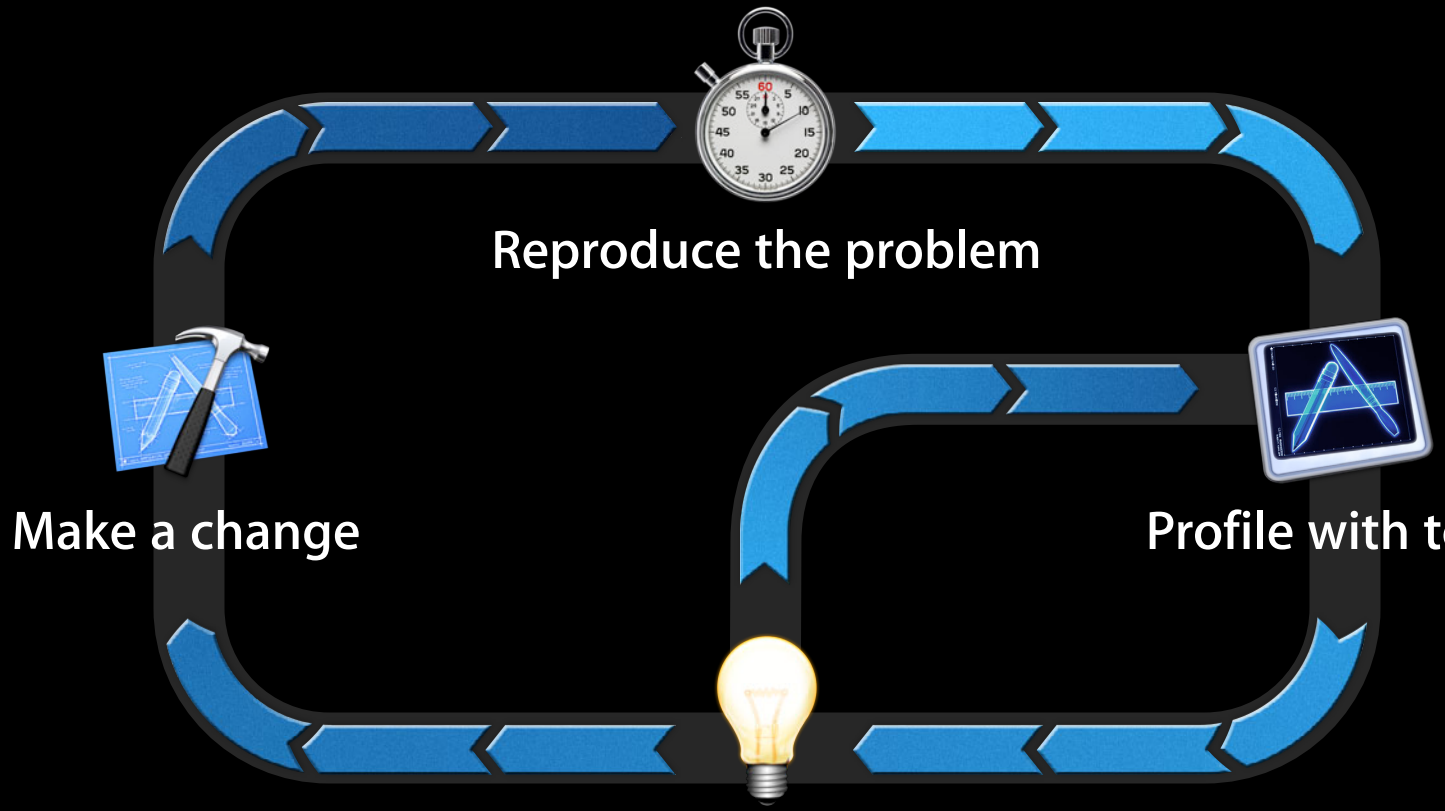

Where Can I Find Instruments?

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How Do I Access Instruments?

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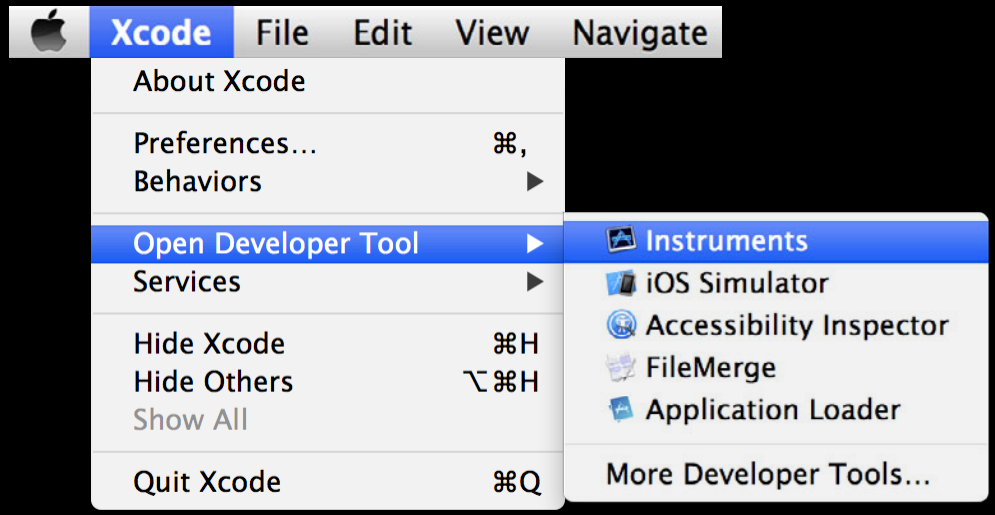

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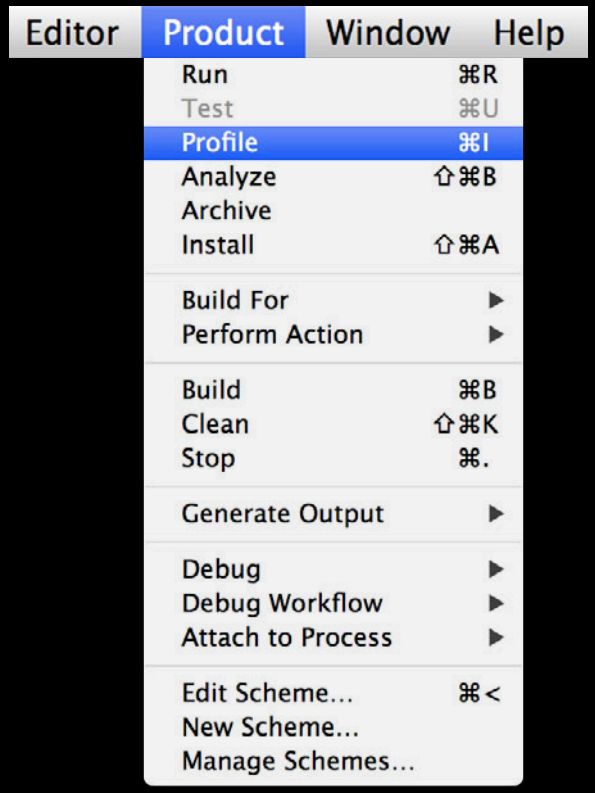
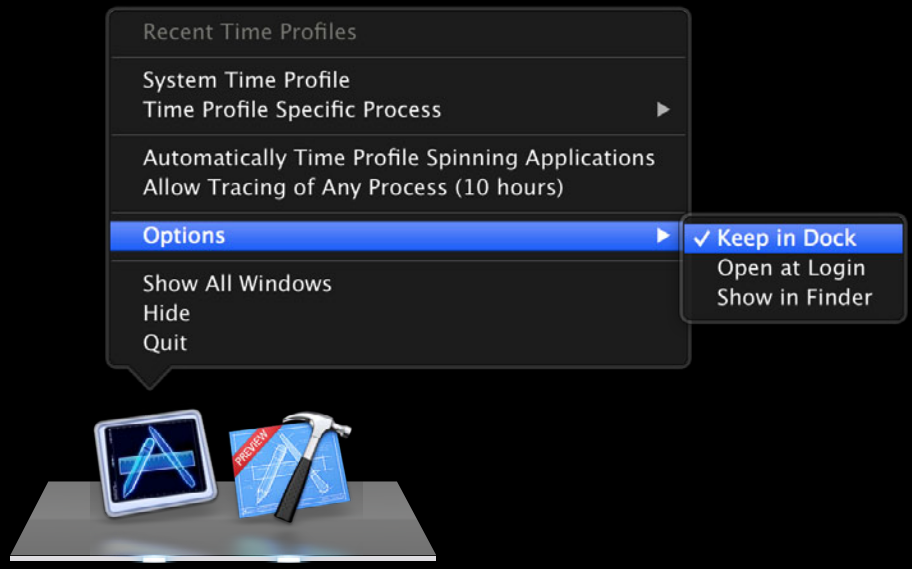
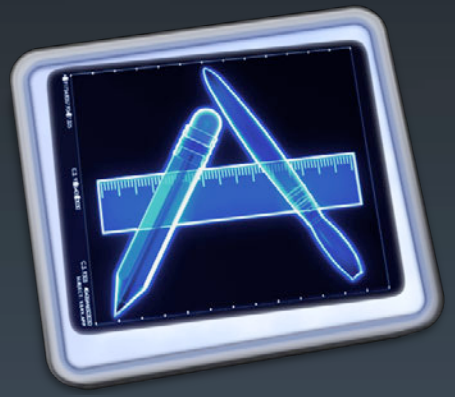


How Do I Access Instruments?

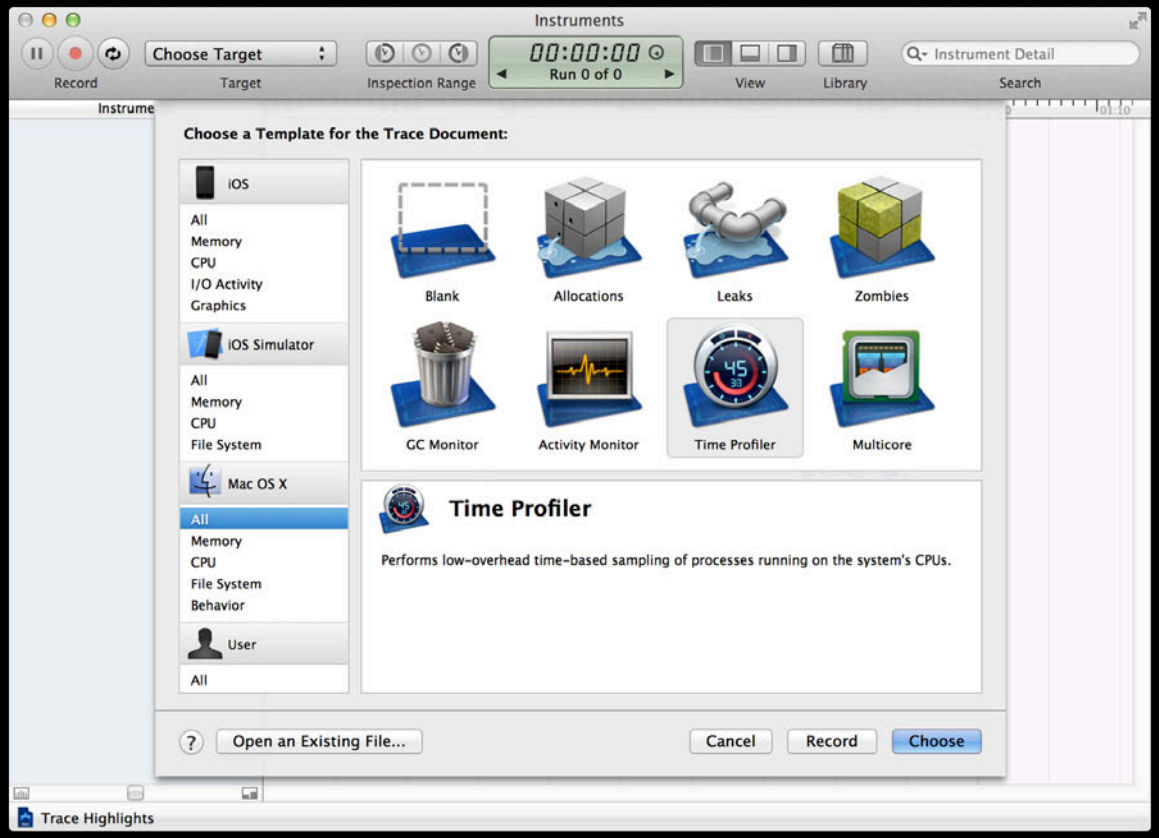
- Pro Tip
  - Right-click and choose Keep in Dock



Instruments Tour



Document Model and Templates



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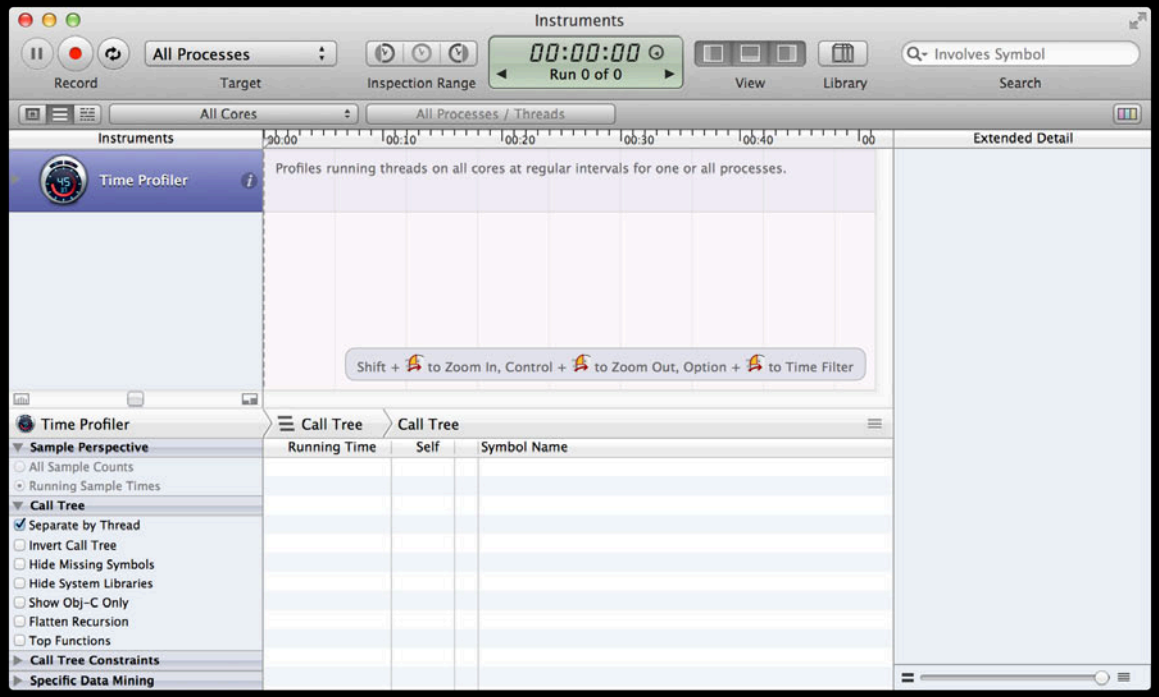
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Involves Symbol
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All Cores
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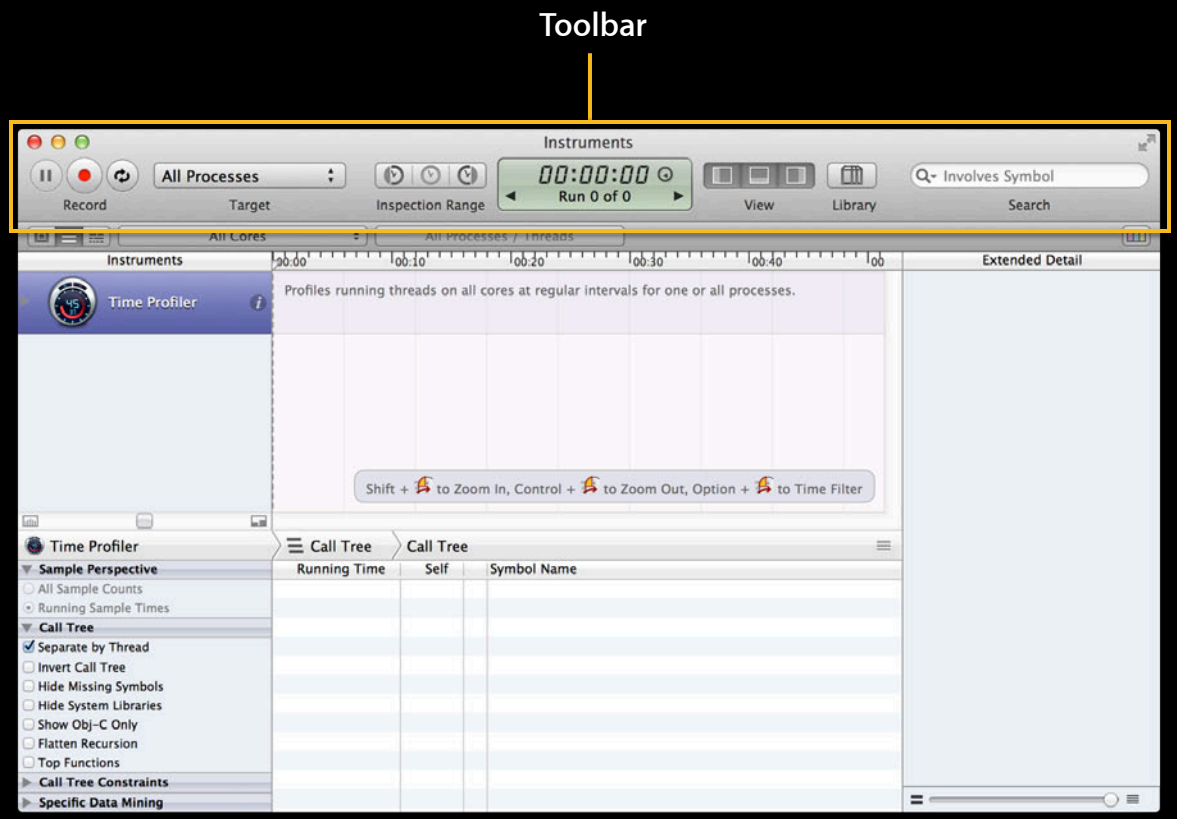
Instruments
Extended Detail
Time Profiler
Profiles running threads on all cores at regular intervals for one or all processes.
Shift + to Zoom In, Control + to Zoom Out, Option + to Time Filter
Time Profiler
Call Tree
Call Tree
Sample Perspective
All Sample Counts
Running Sample Times
Call Tree
Separate by Thread
Invert Call Tree
Hide Missing Symbols
Hide System Libraries
Show Obj-C Only
Flatten Recursion
Top Functions
Call Tree Constraints
Specific Data Mining
Running Time
Self
Symbol Name

Tour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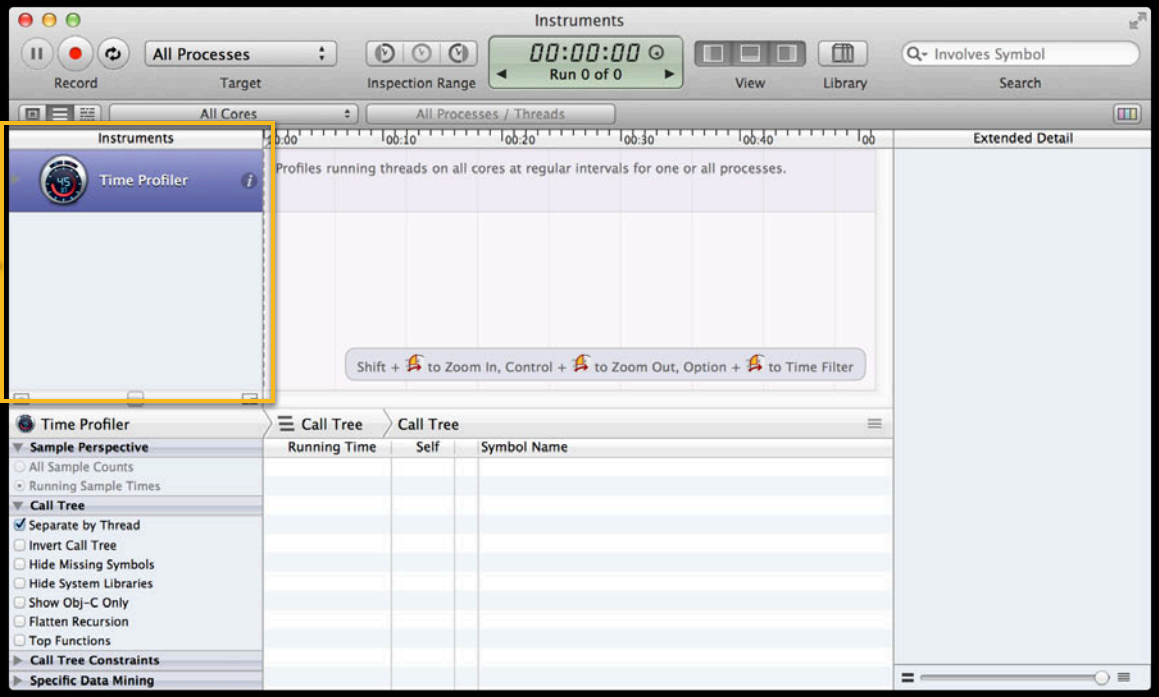
Strategies



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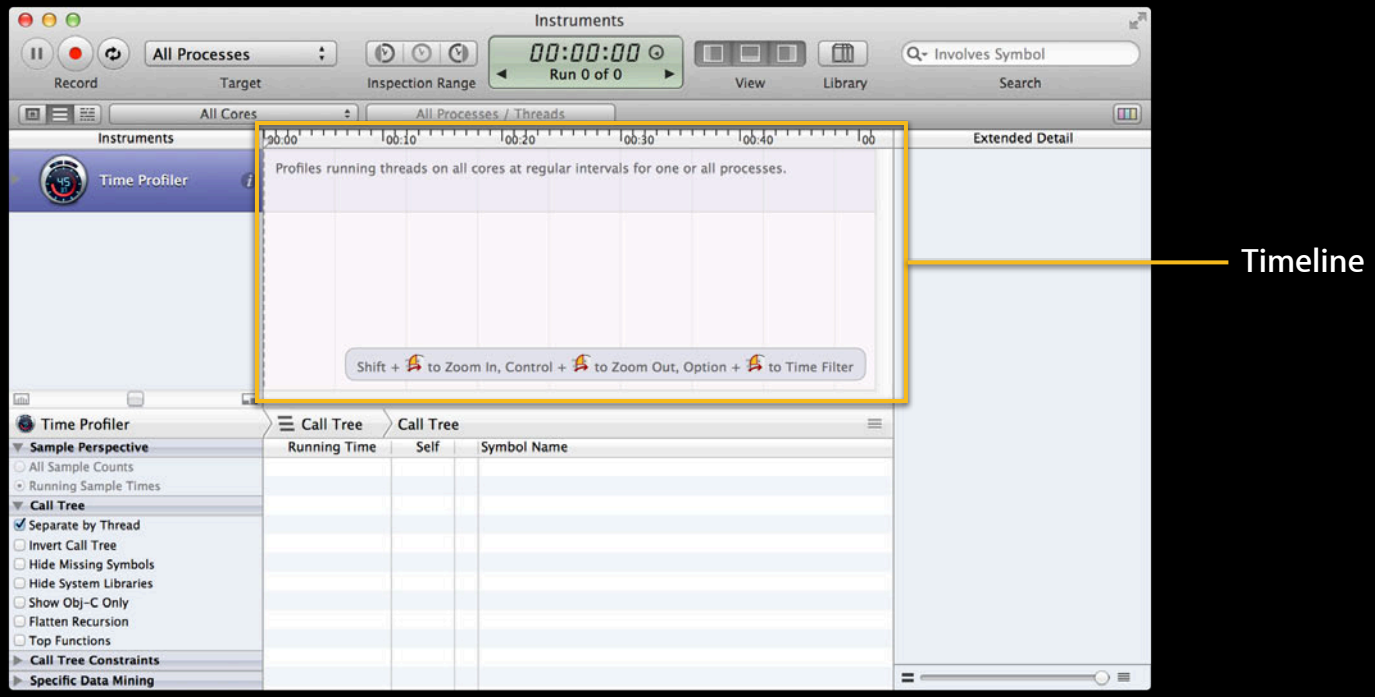
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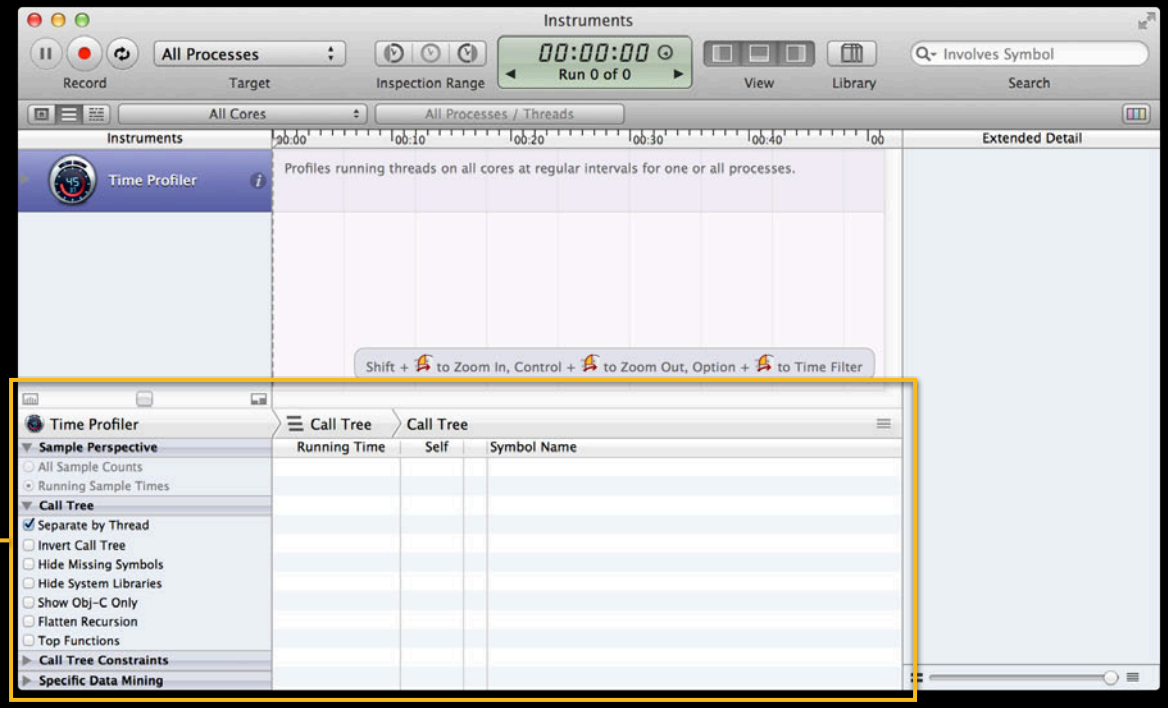
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Details

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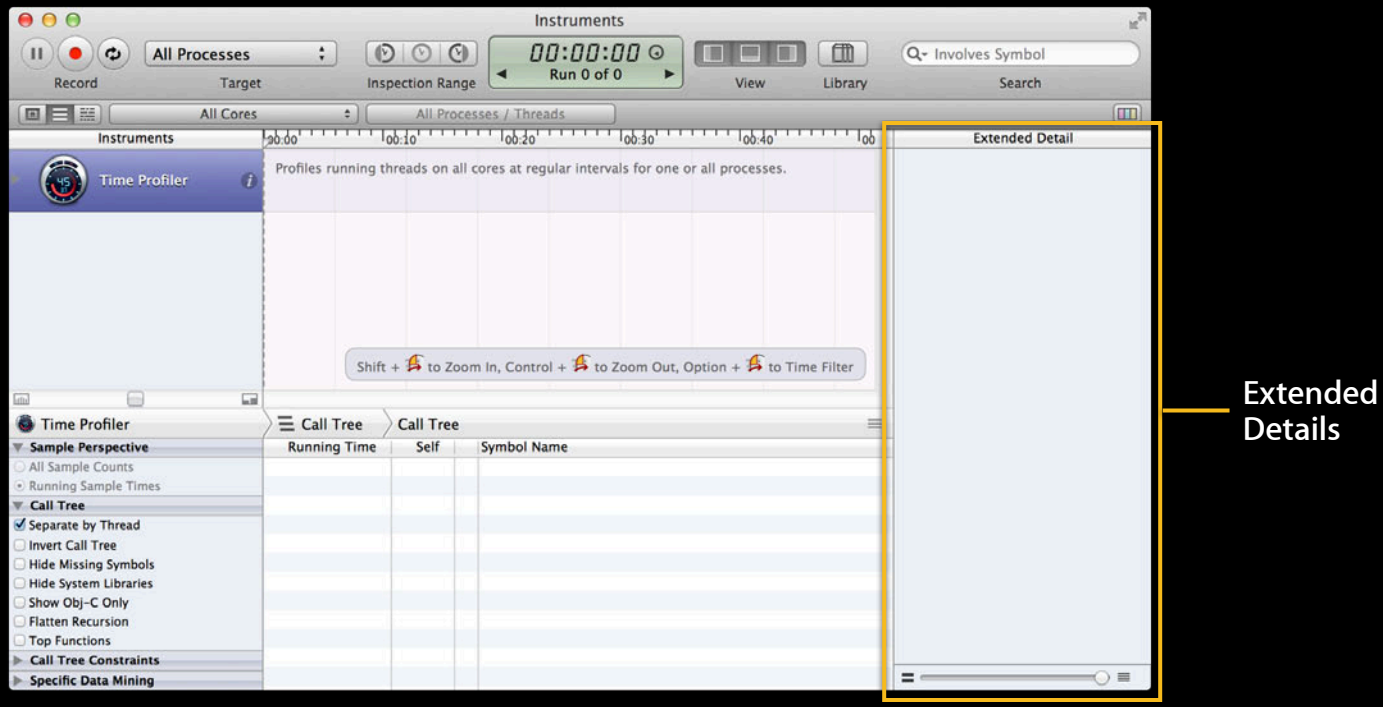
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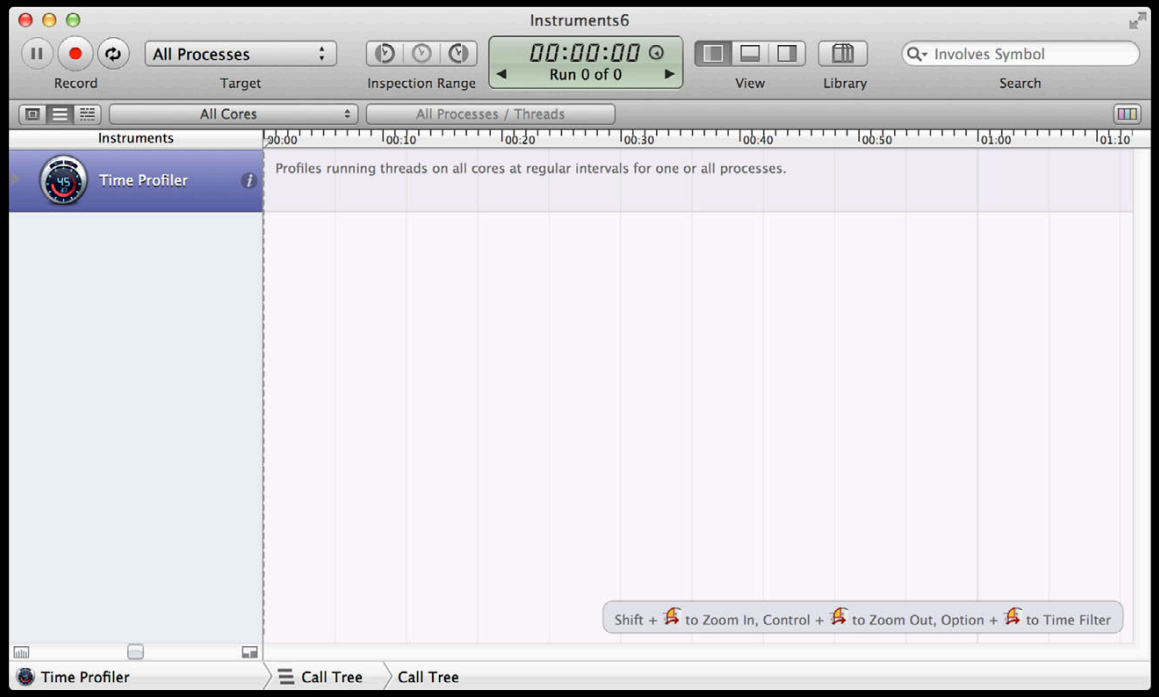
Toolbar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Call Tree

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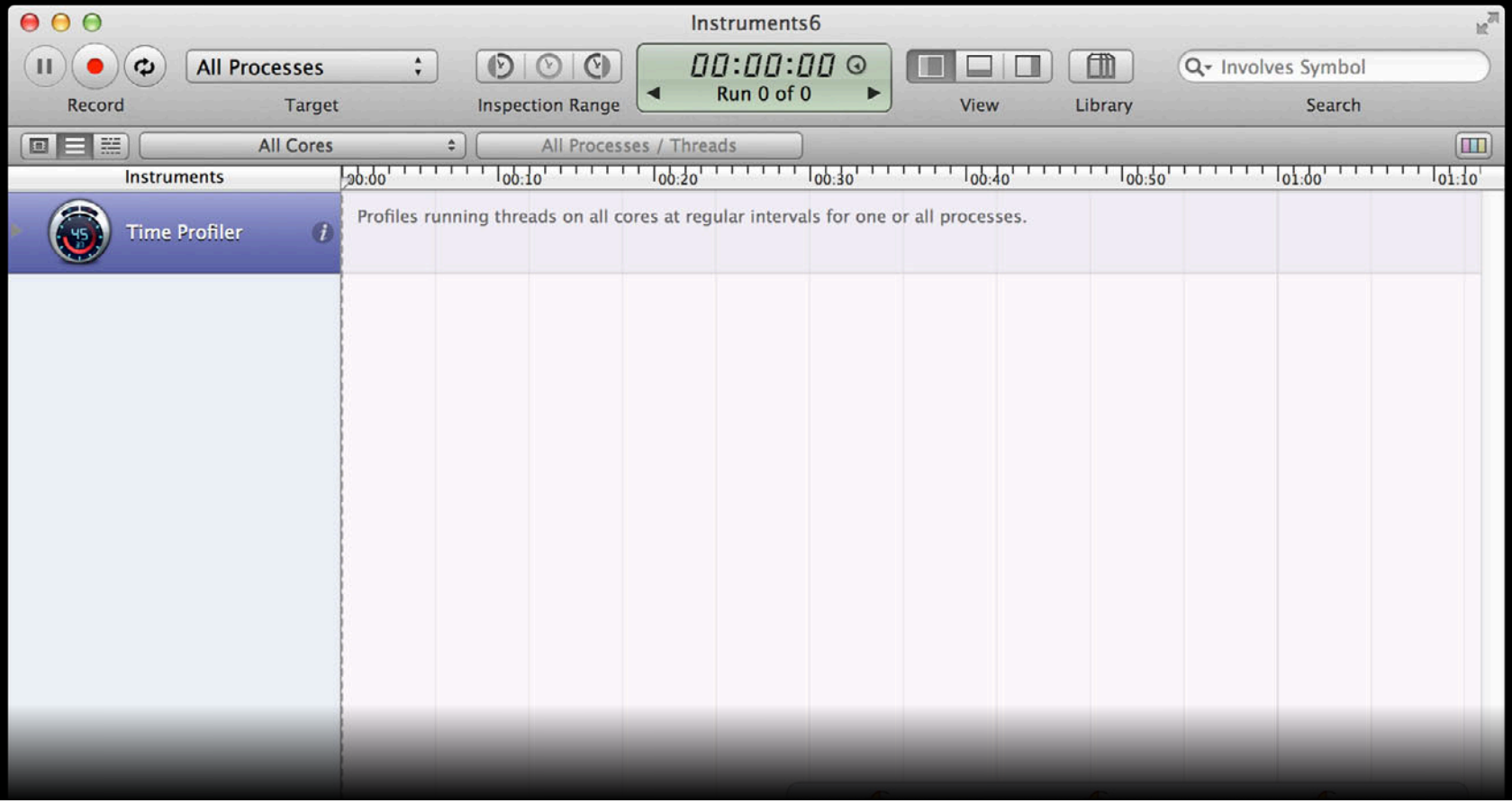
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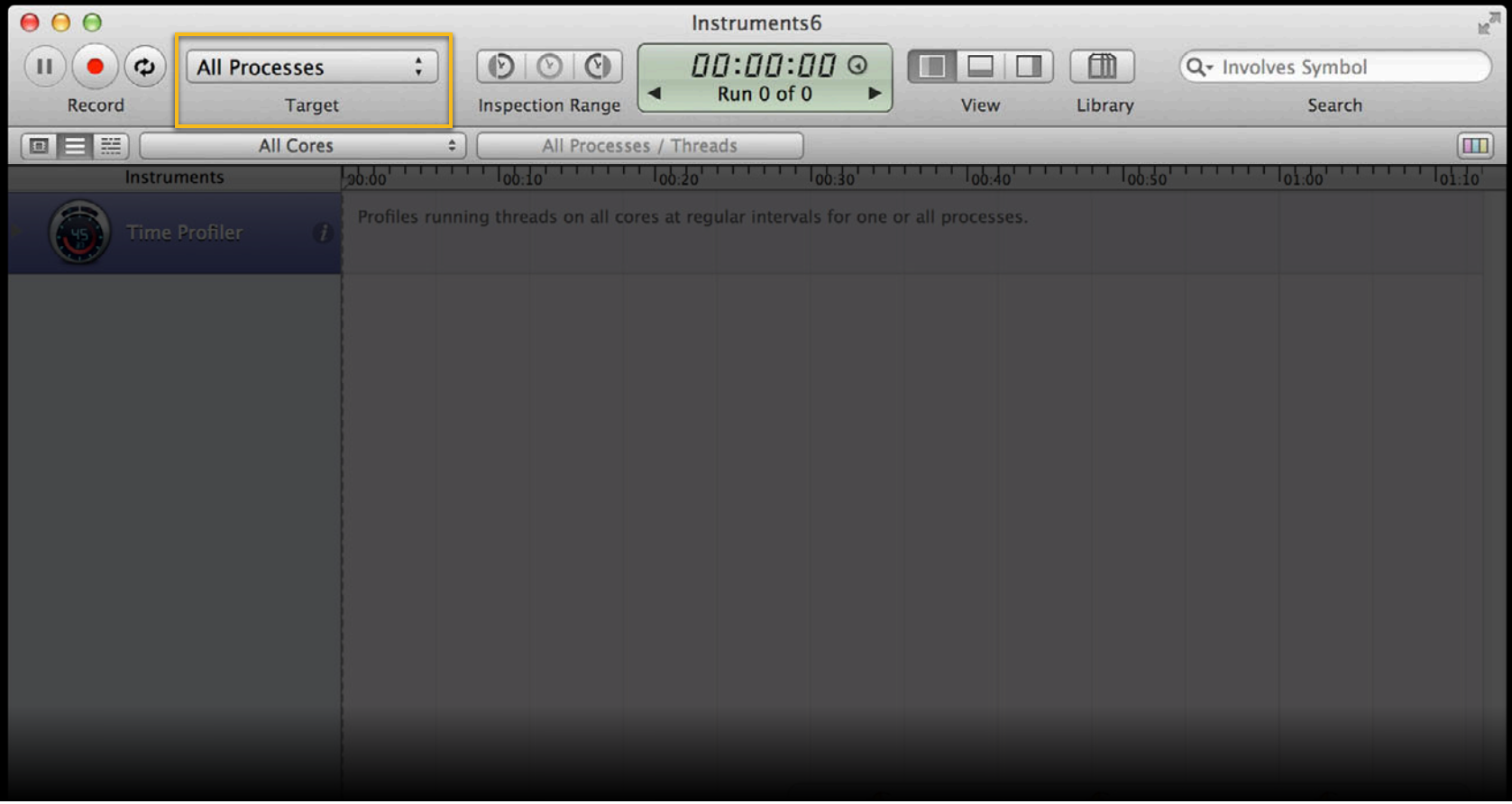
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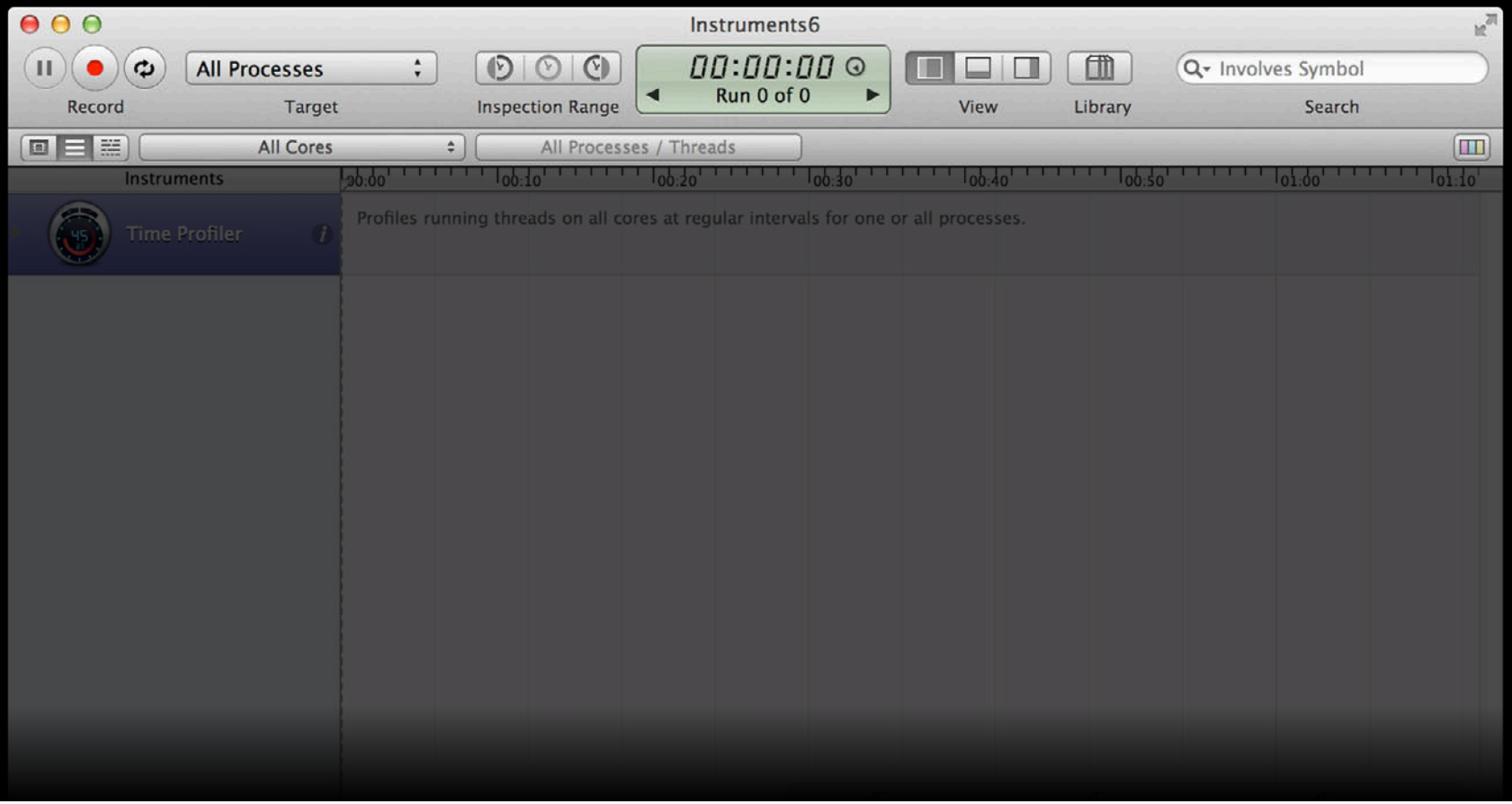
Toolbar

Target menu



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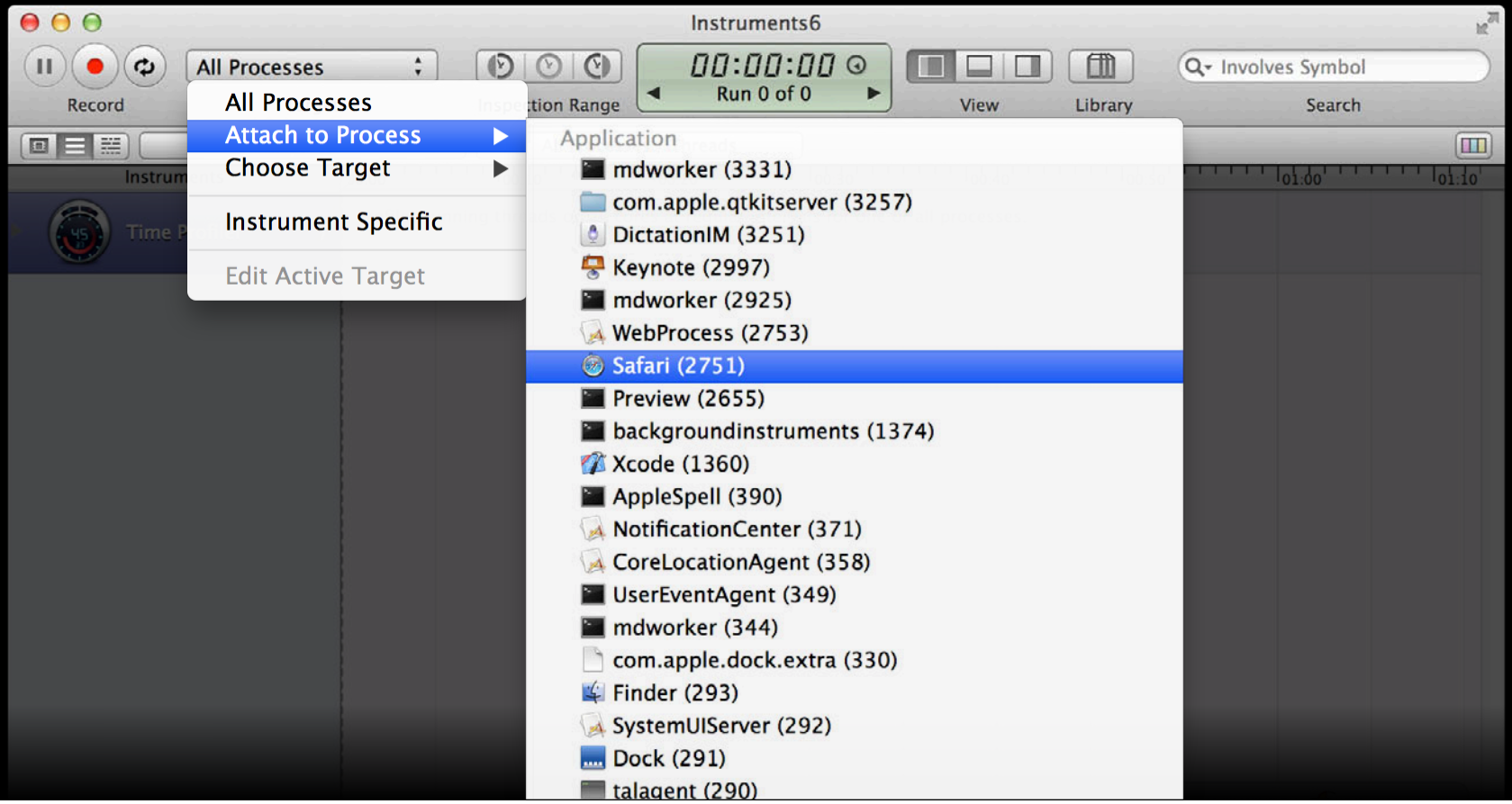
Target menu



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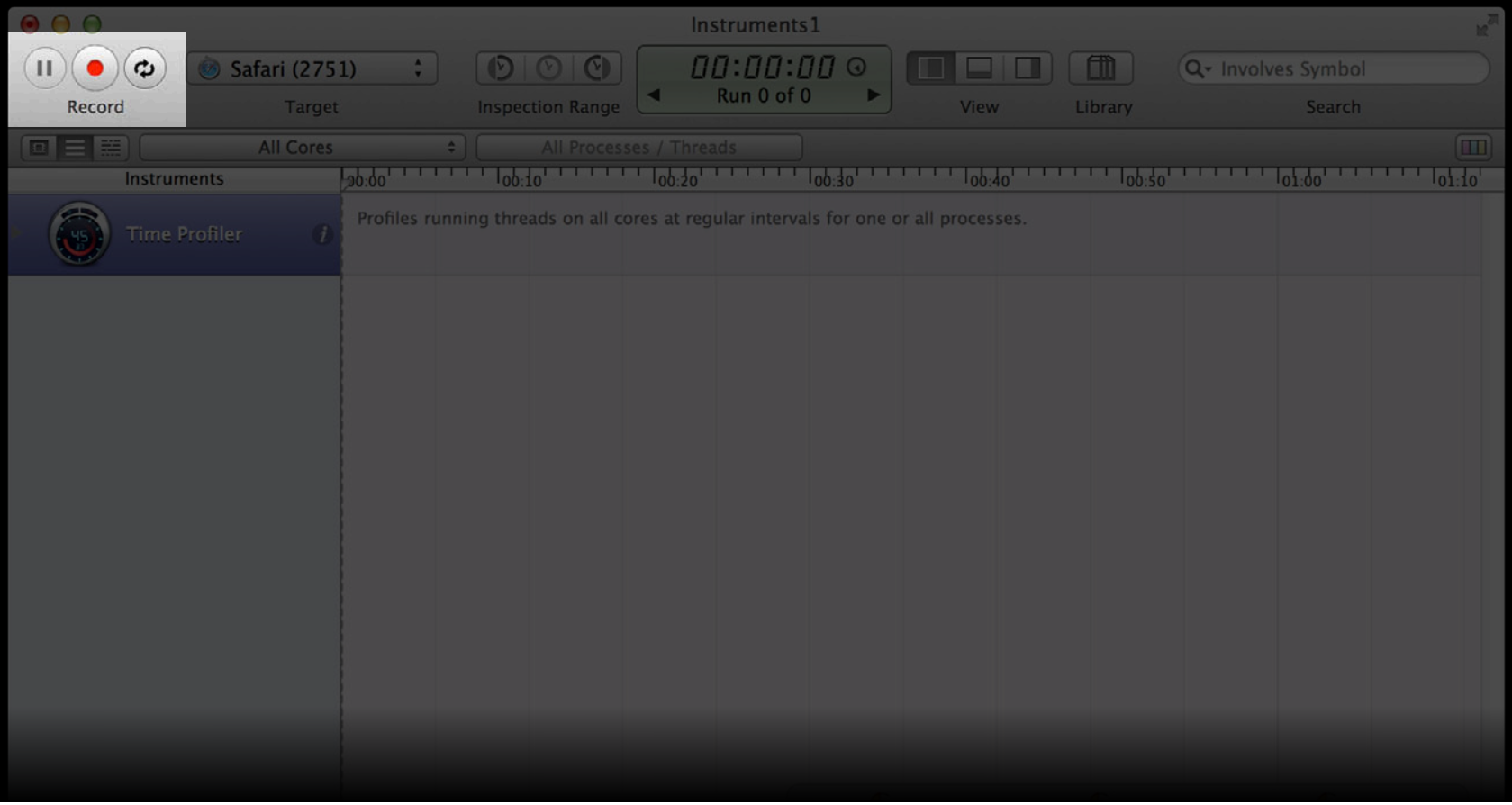
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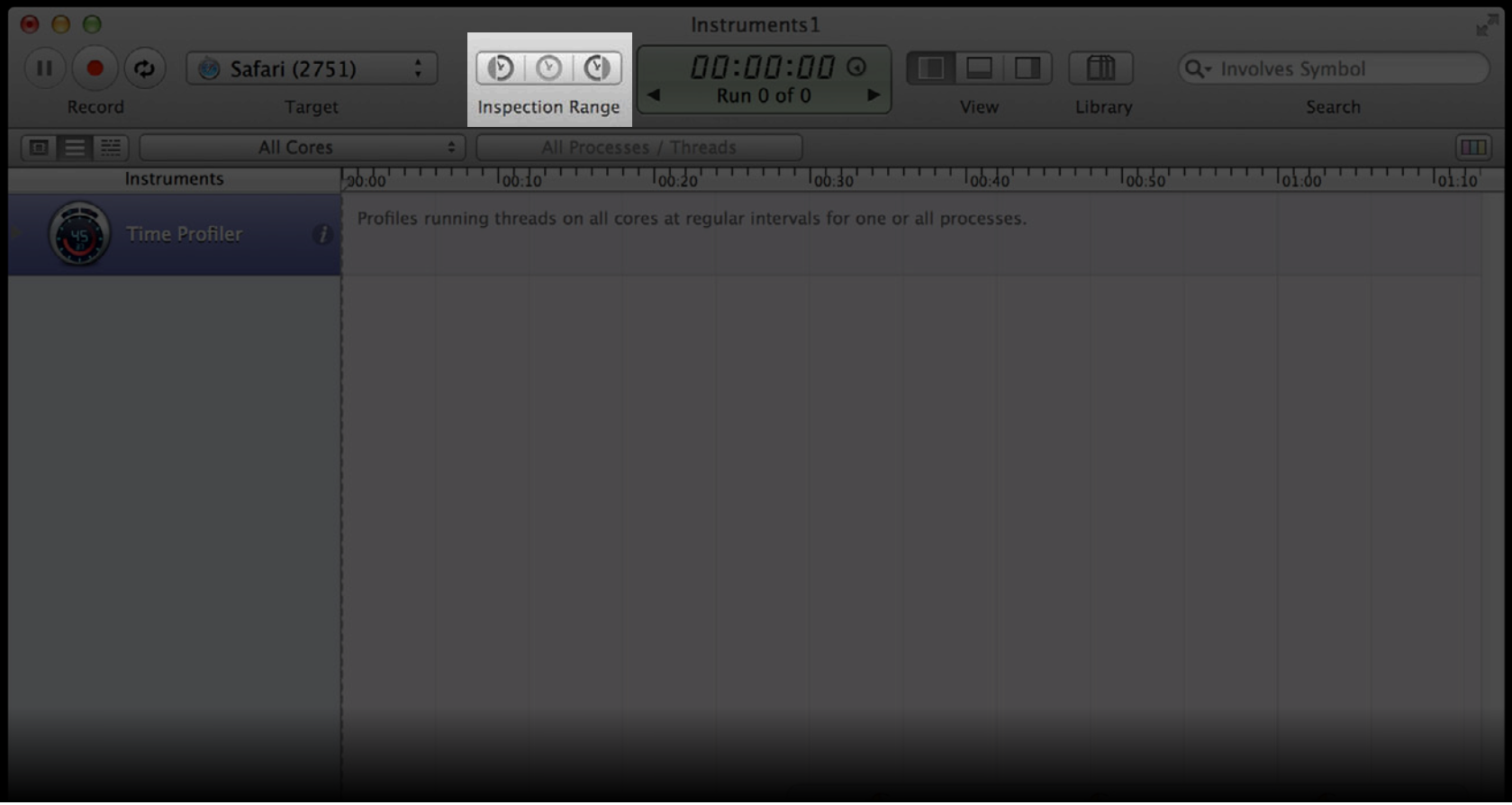
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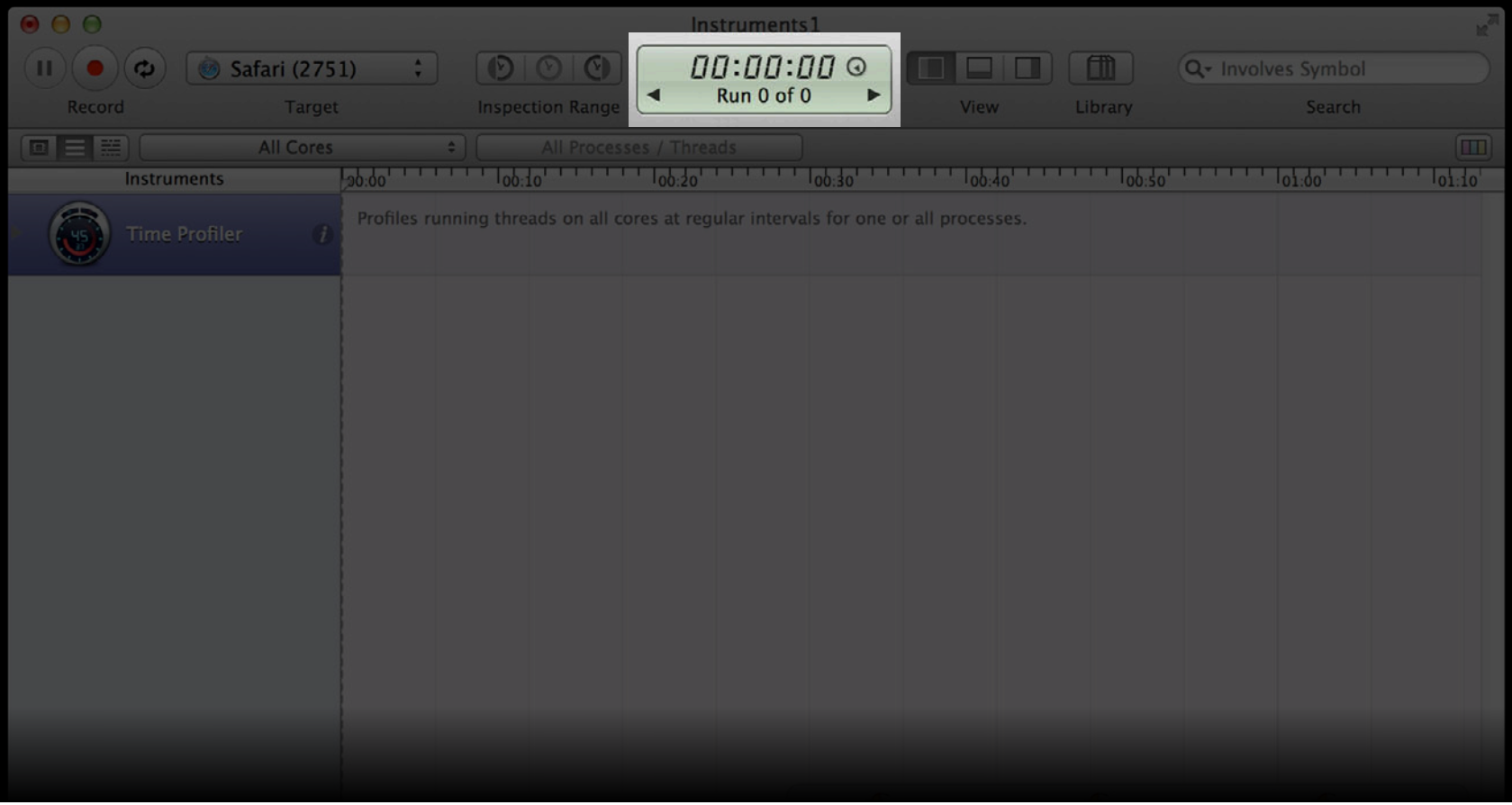
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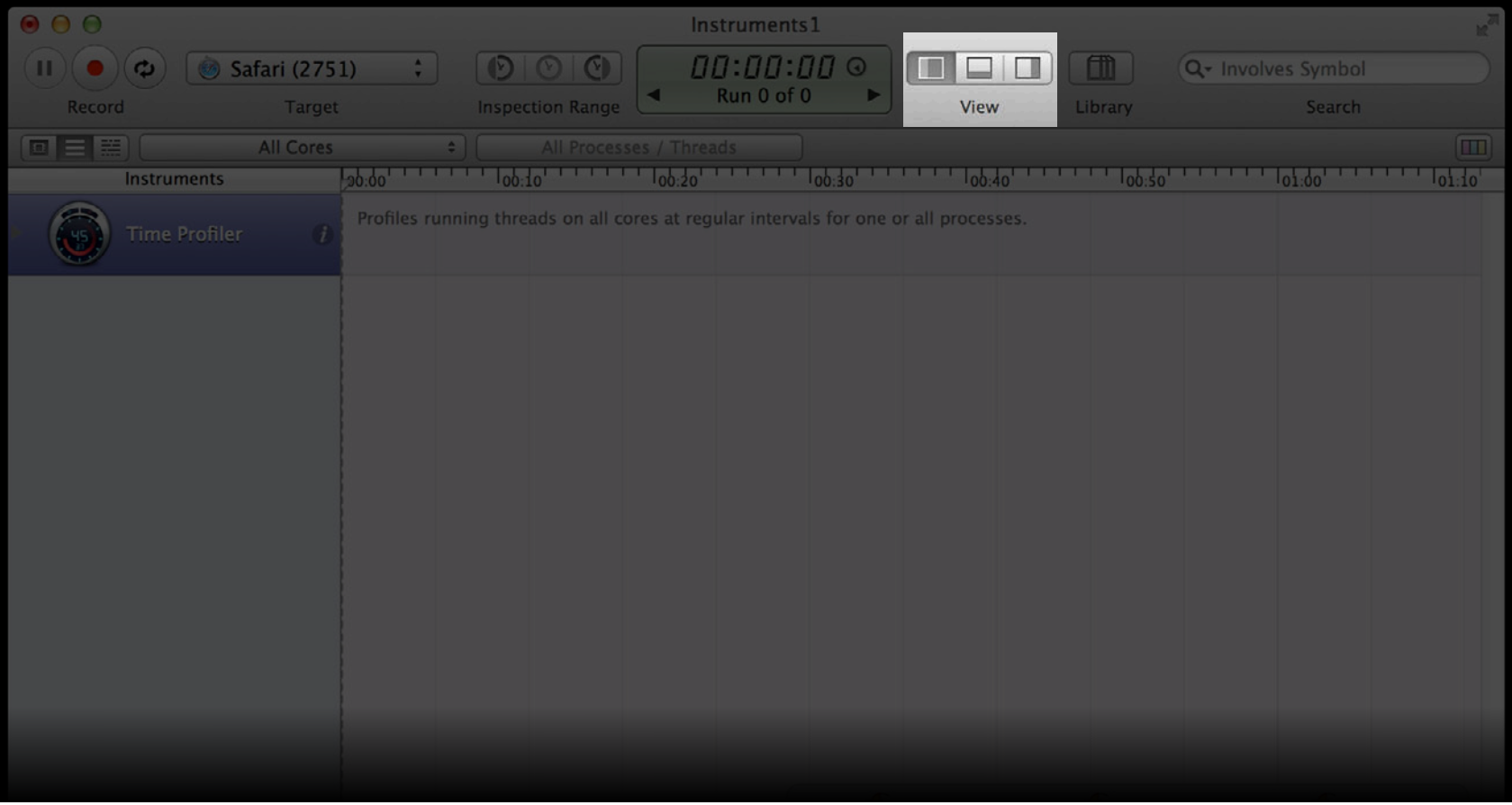
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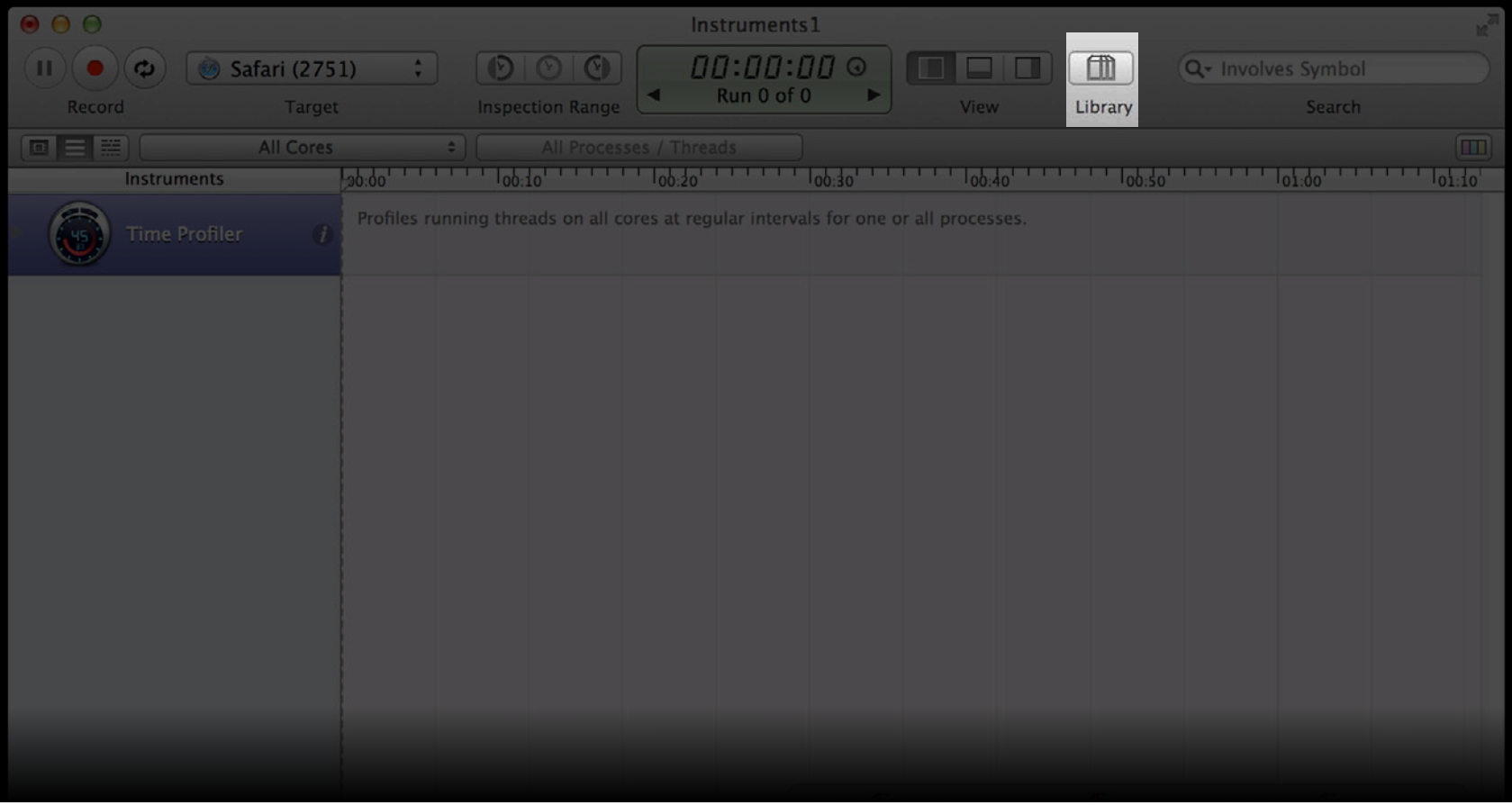
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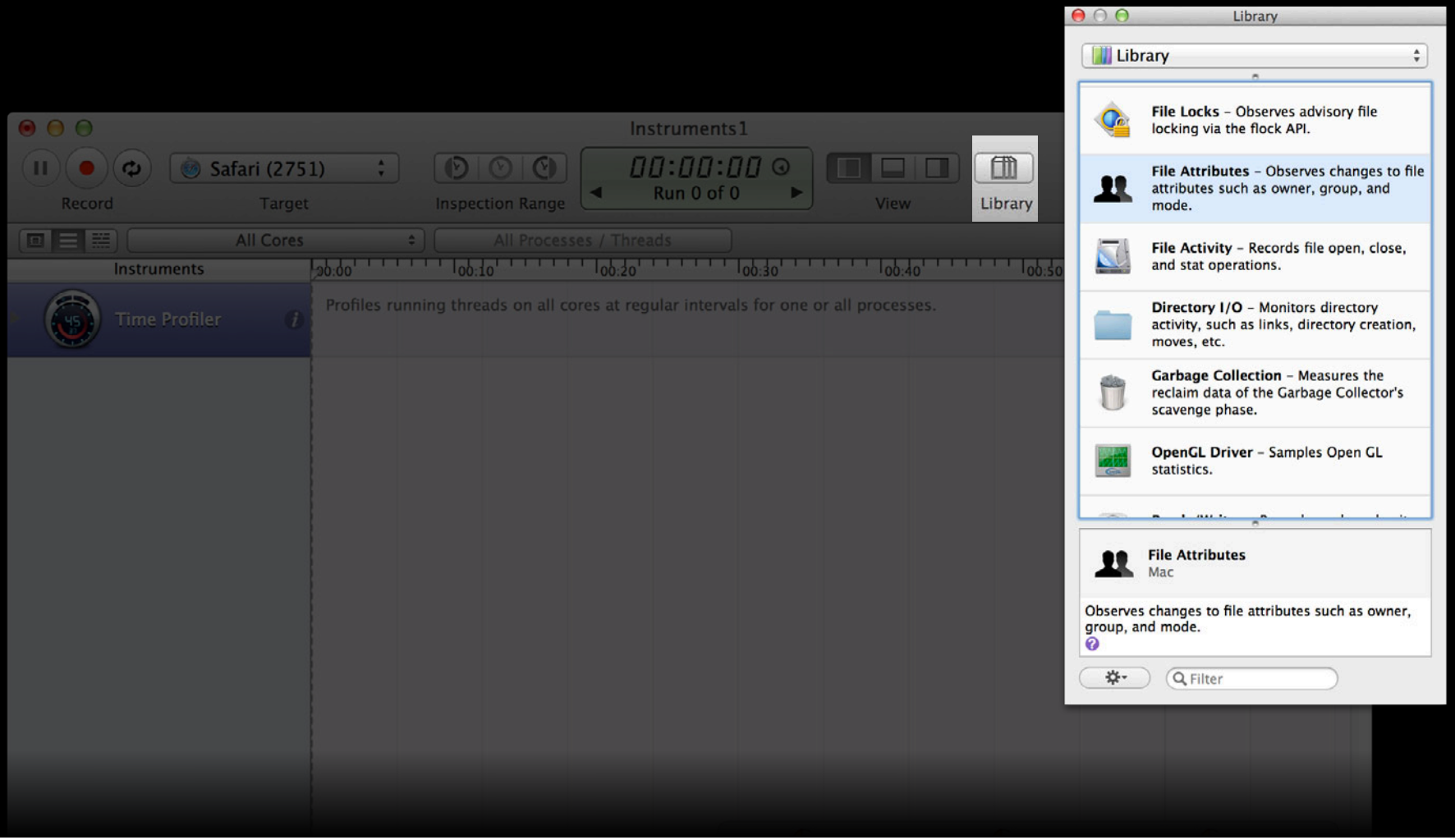
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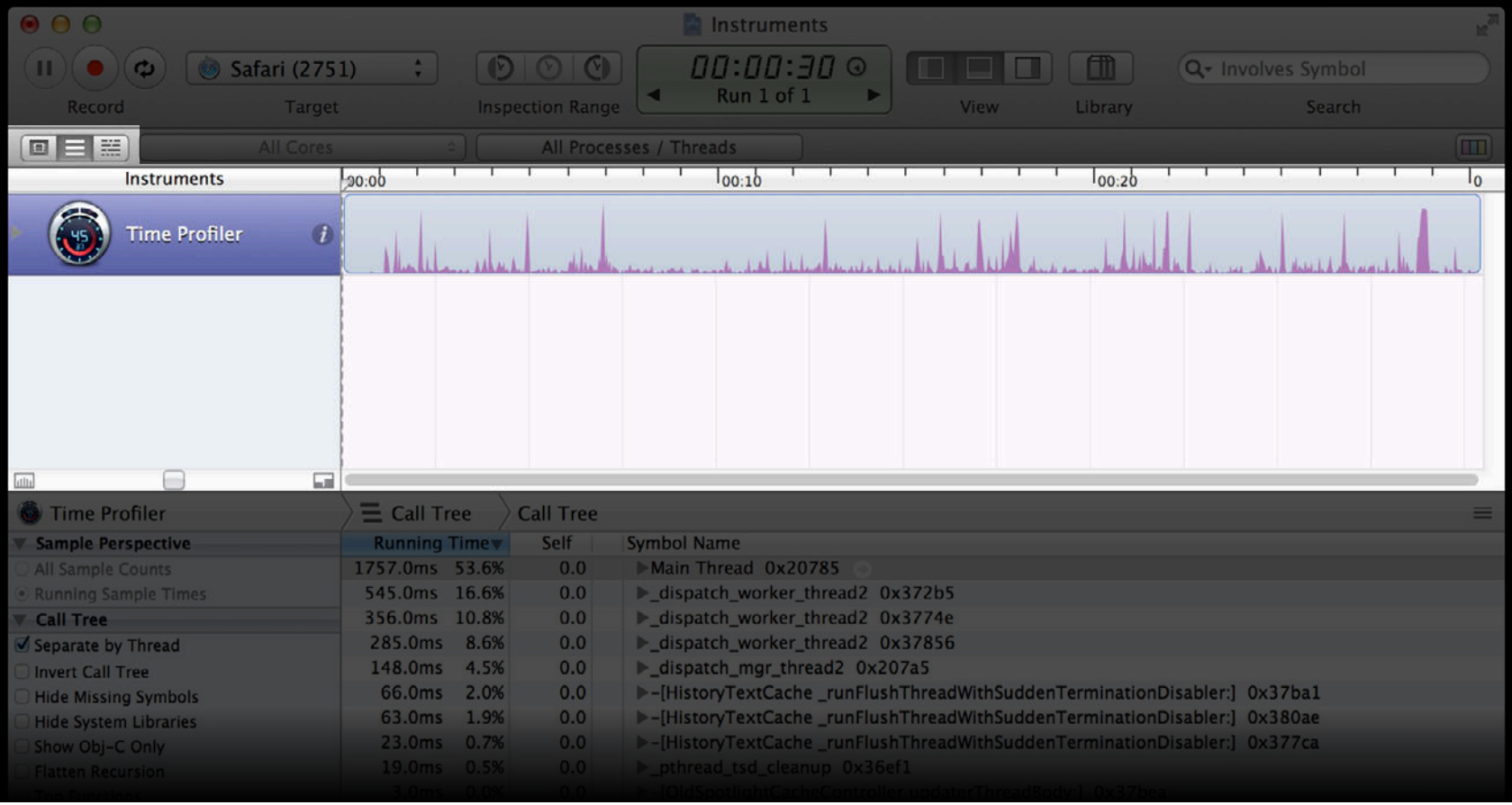
Library
Library
File Locks – Observes advisory file locking via the flock API.
File Attributes – Observes changes to file attributes such as owner, group, and mode.
File Activity – Records file open, close, and stat operations.
Directory I/O – Monitors directory activity, such as links, directory creation, moves, etc.
Garbage Collection – Measures the reclaim data of the Garbage Collector's scavenge phase.
OpenGL Driver – Samples Open GL statistics.
File Attributes
Mac
Observes changes to file attributes such as owner, group, and mode.
Filter

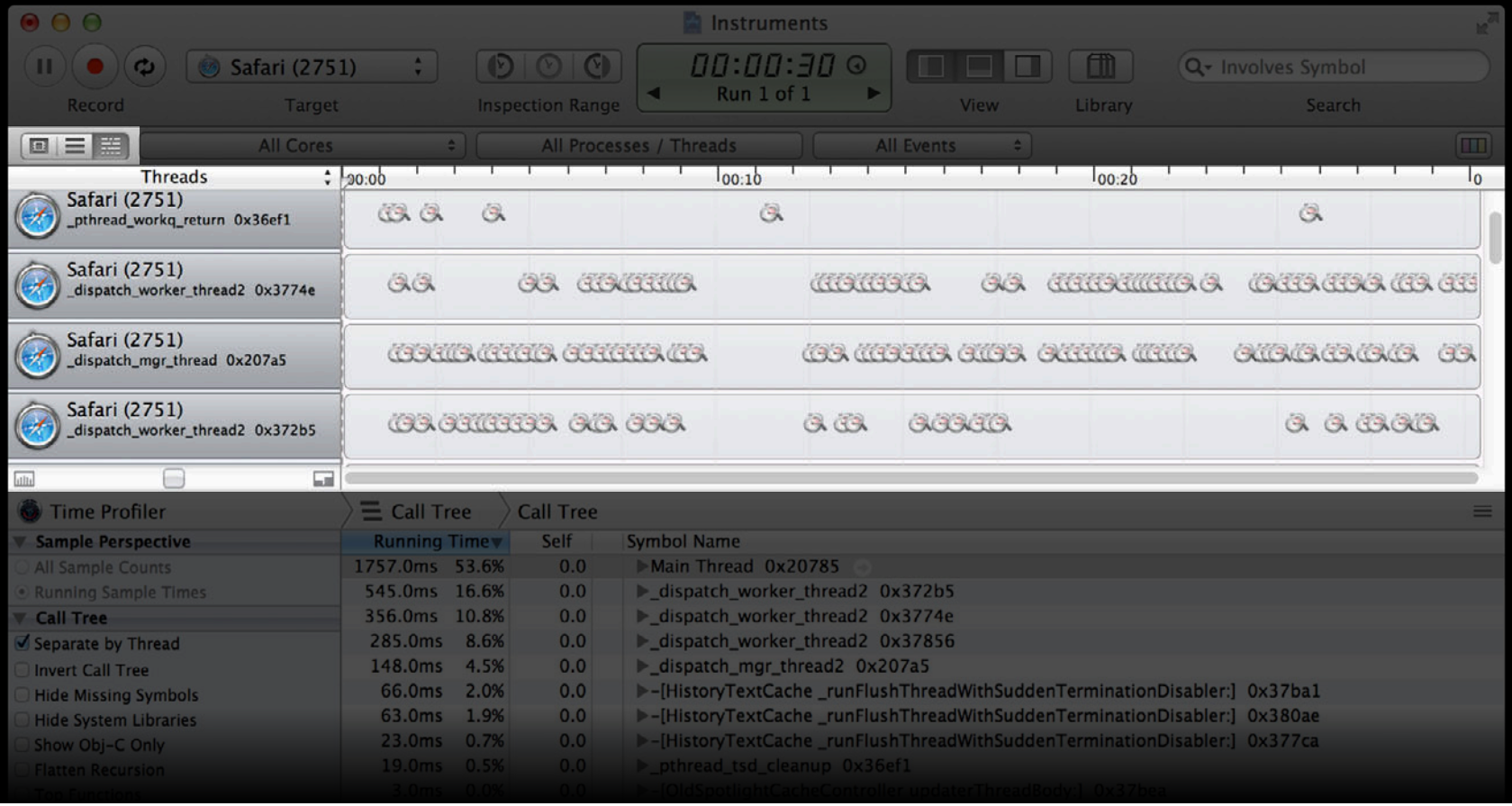
Timeline

Instrument strategy



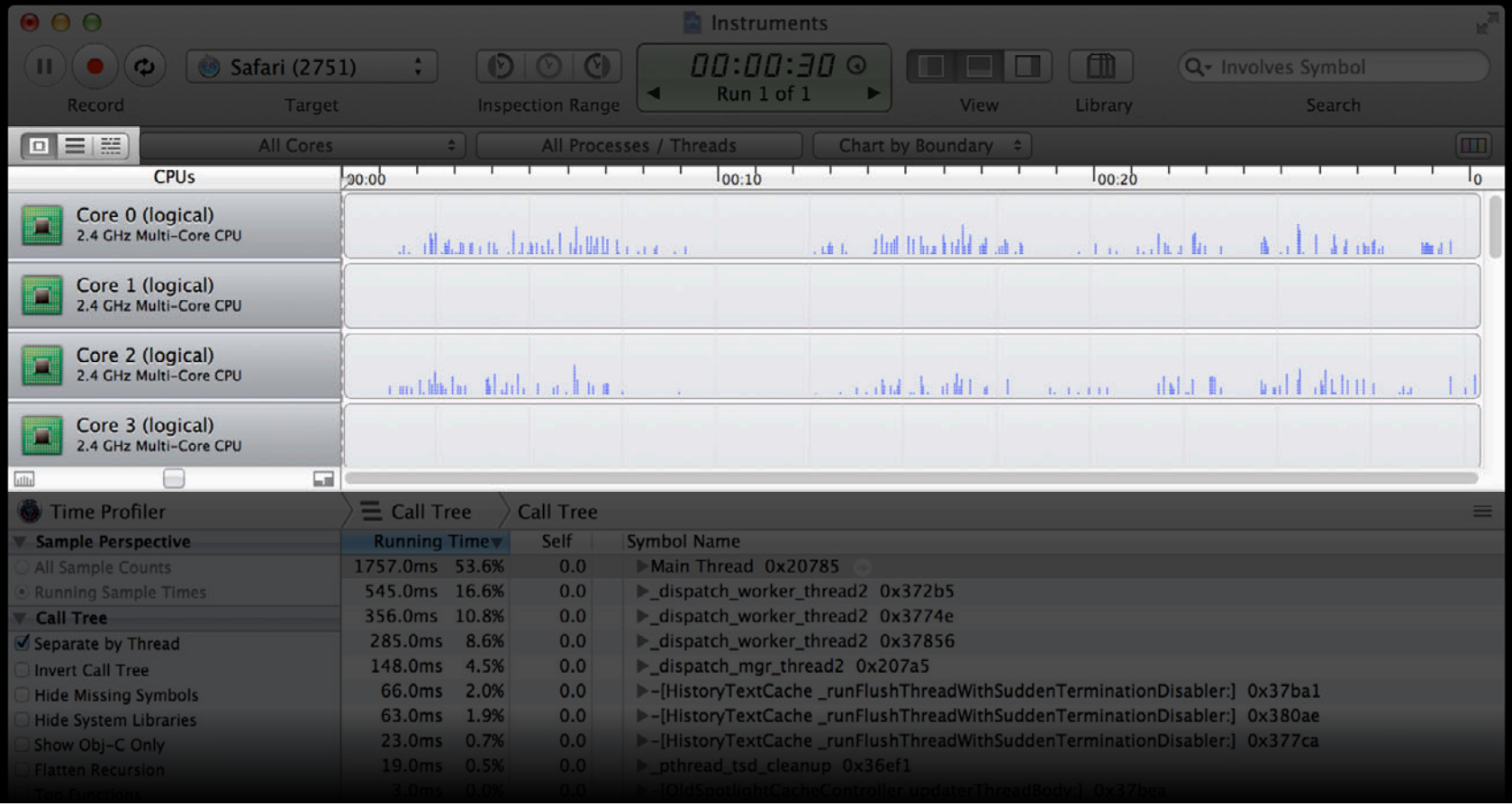
Timeline

Threads strategy



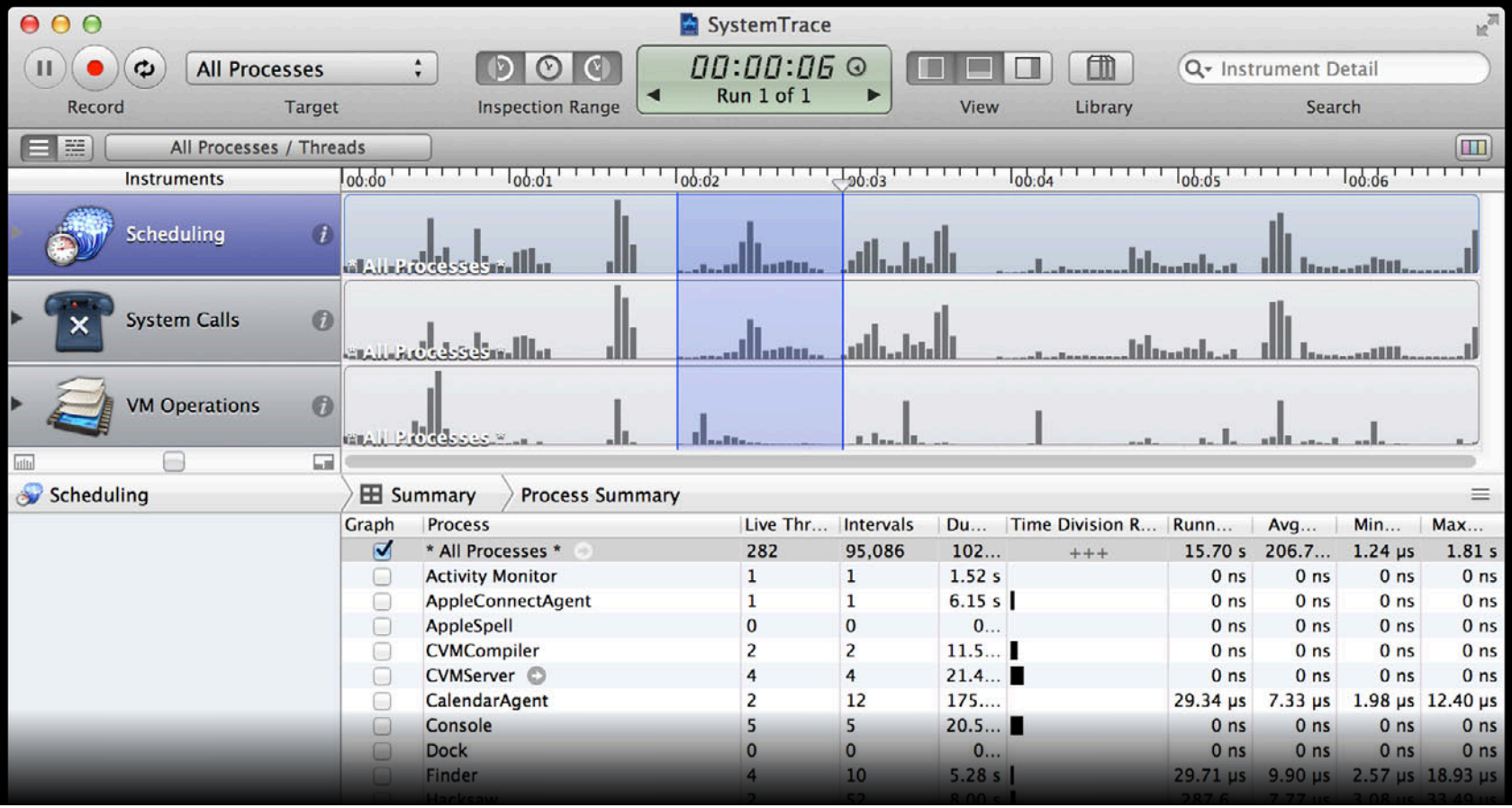
Timeline

CPU strategy



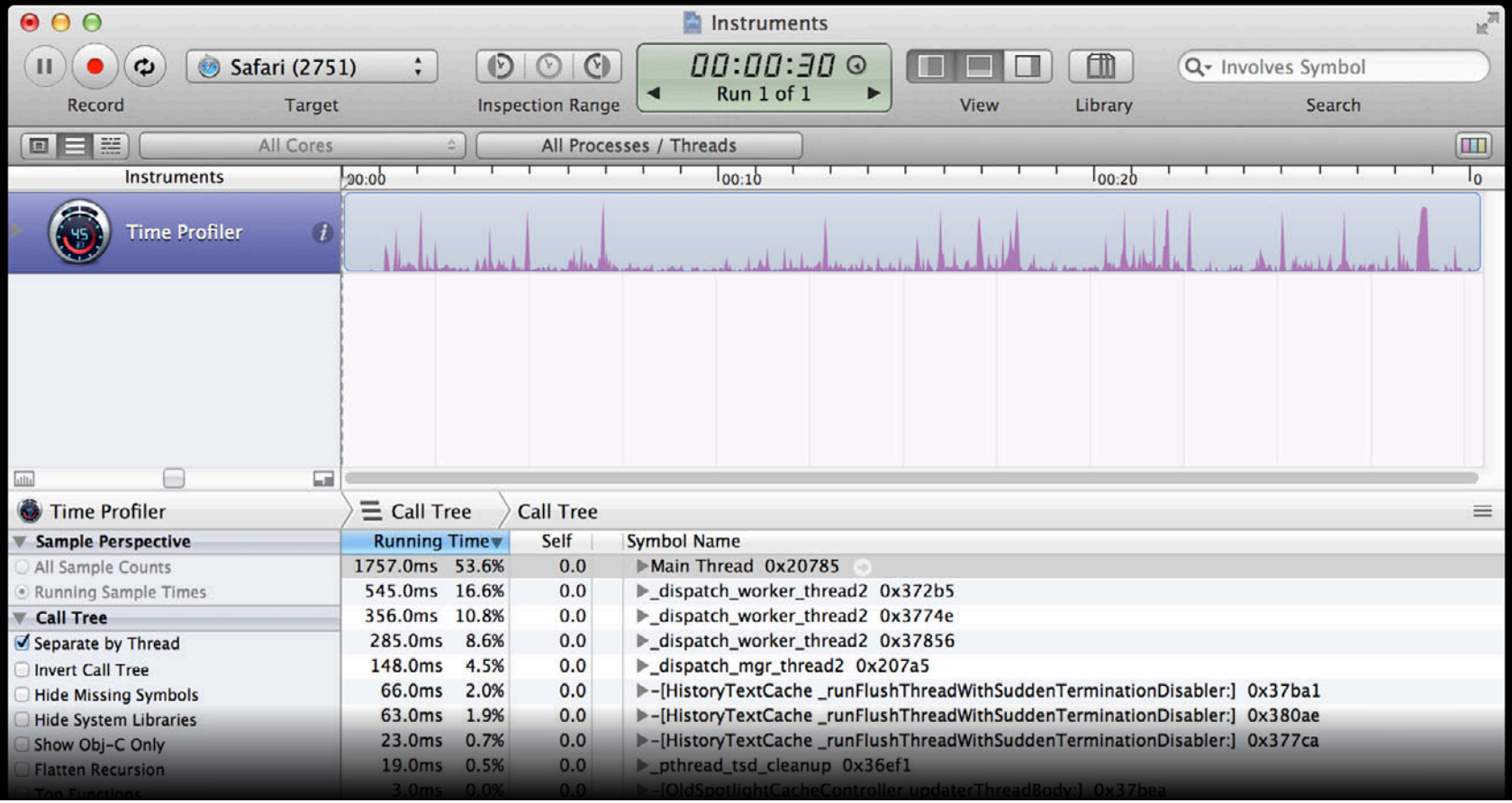
Timeline and Filtering

System Trace



Detail Pane

Call Tree



Detail Pane

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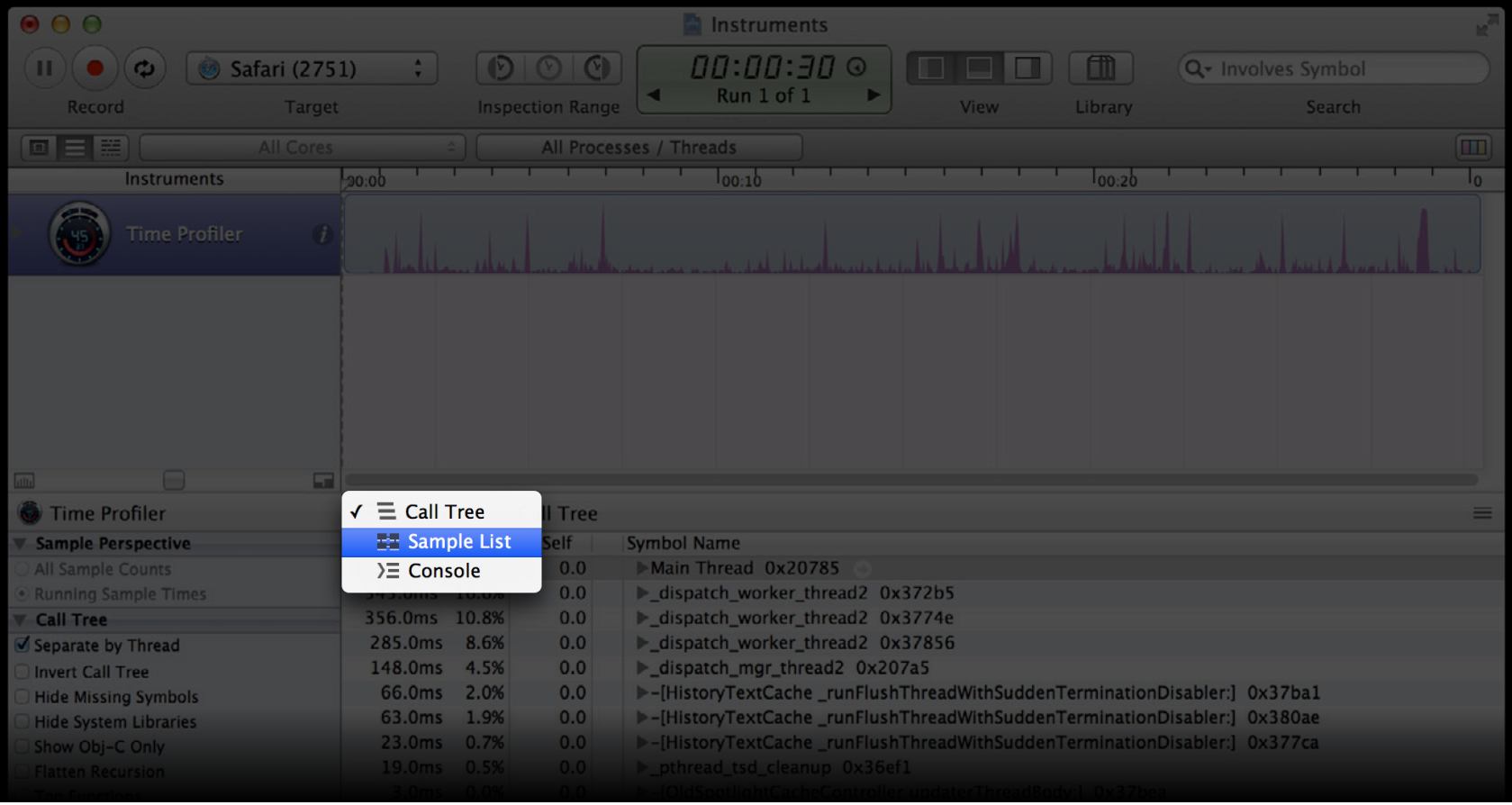
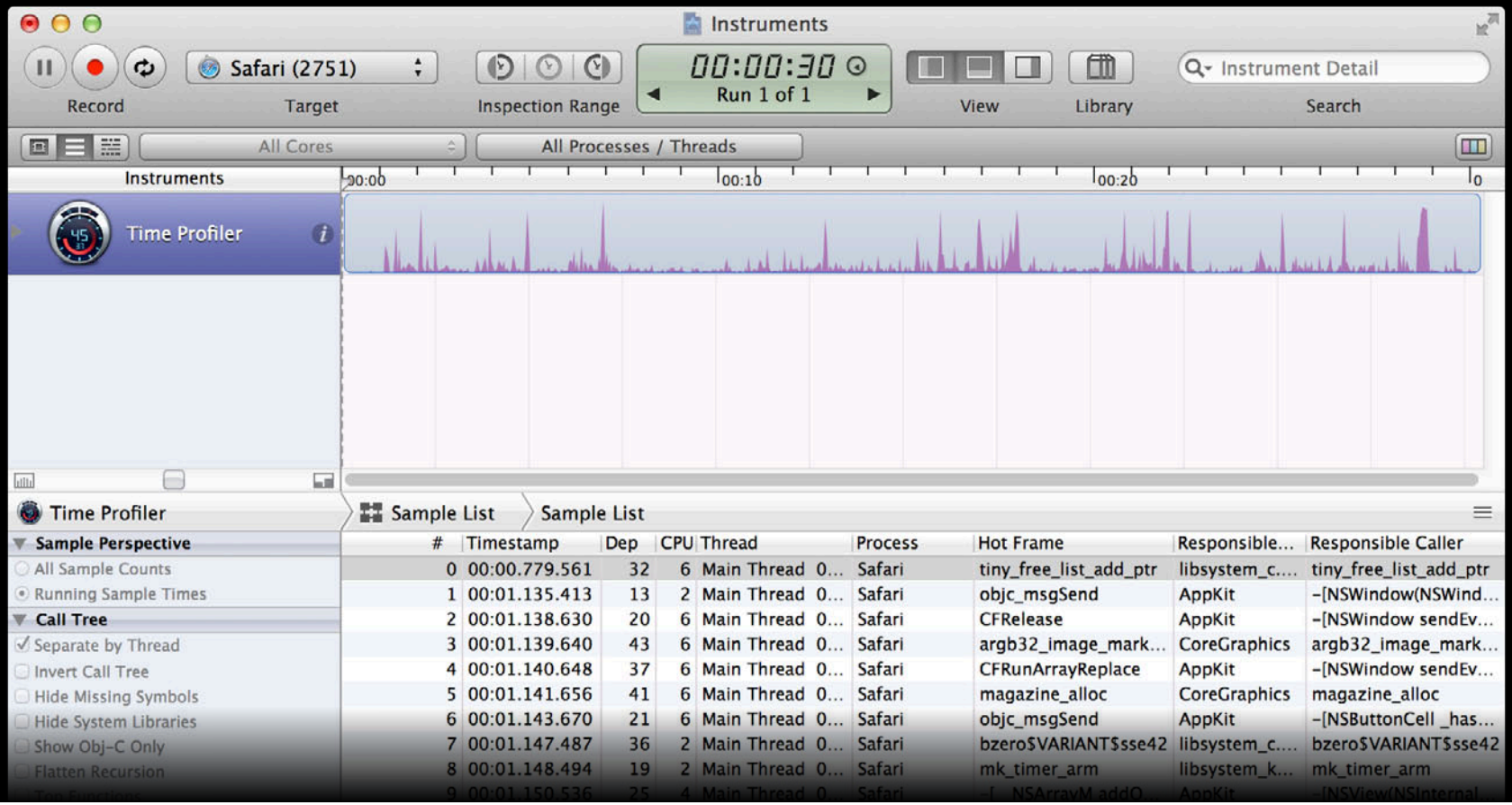


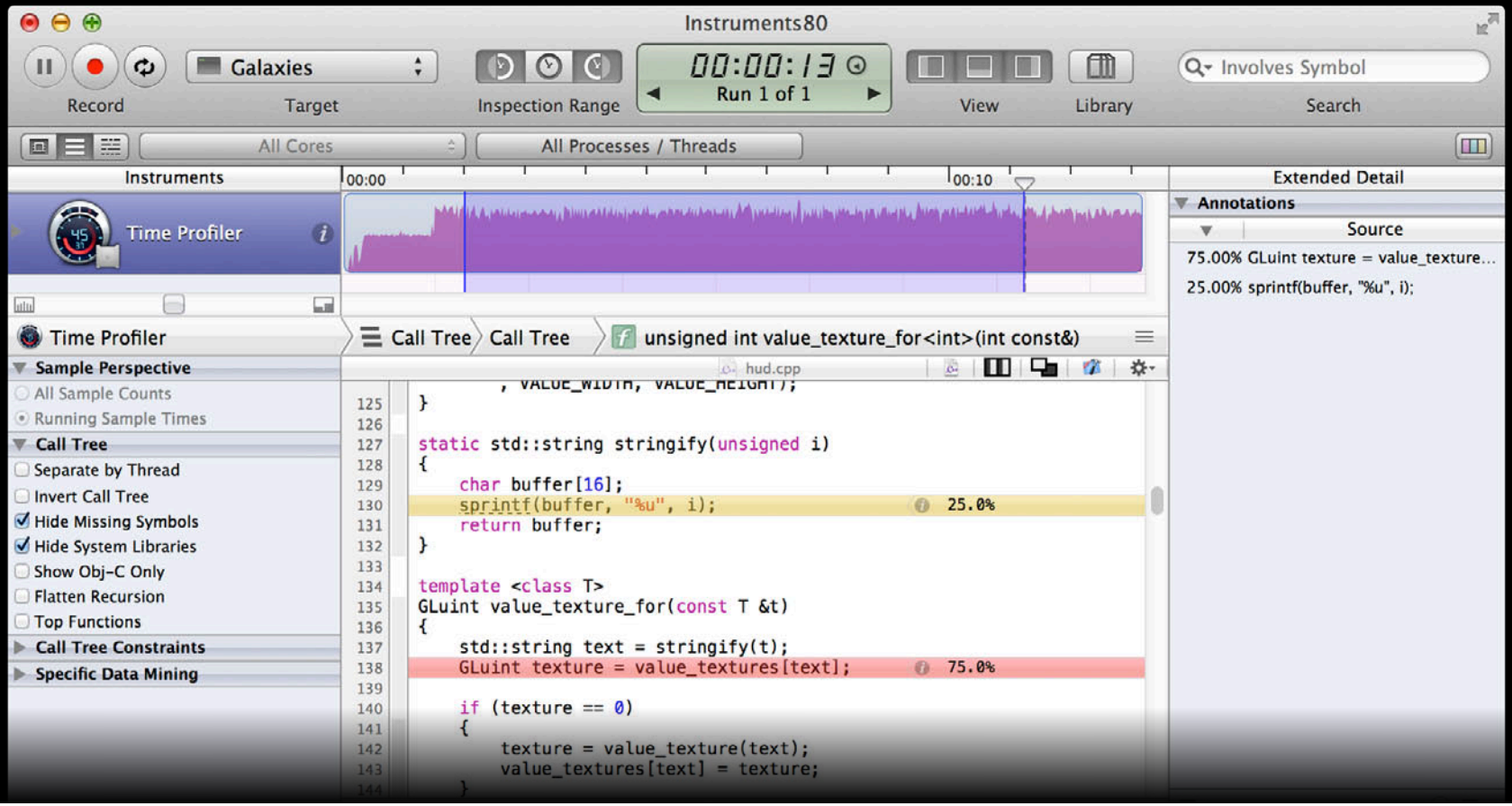
Detail Pane

Sample List



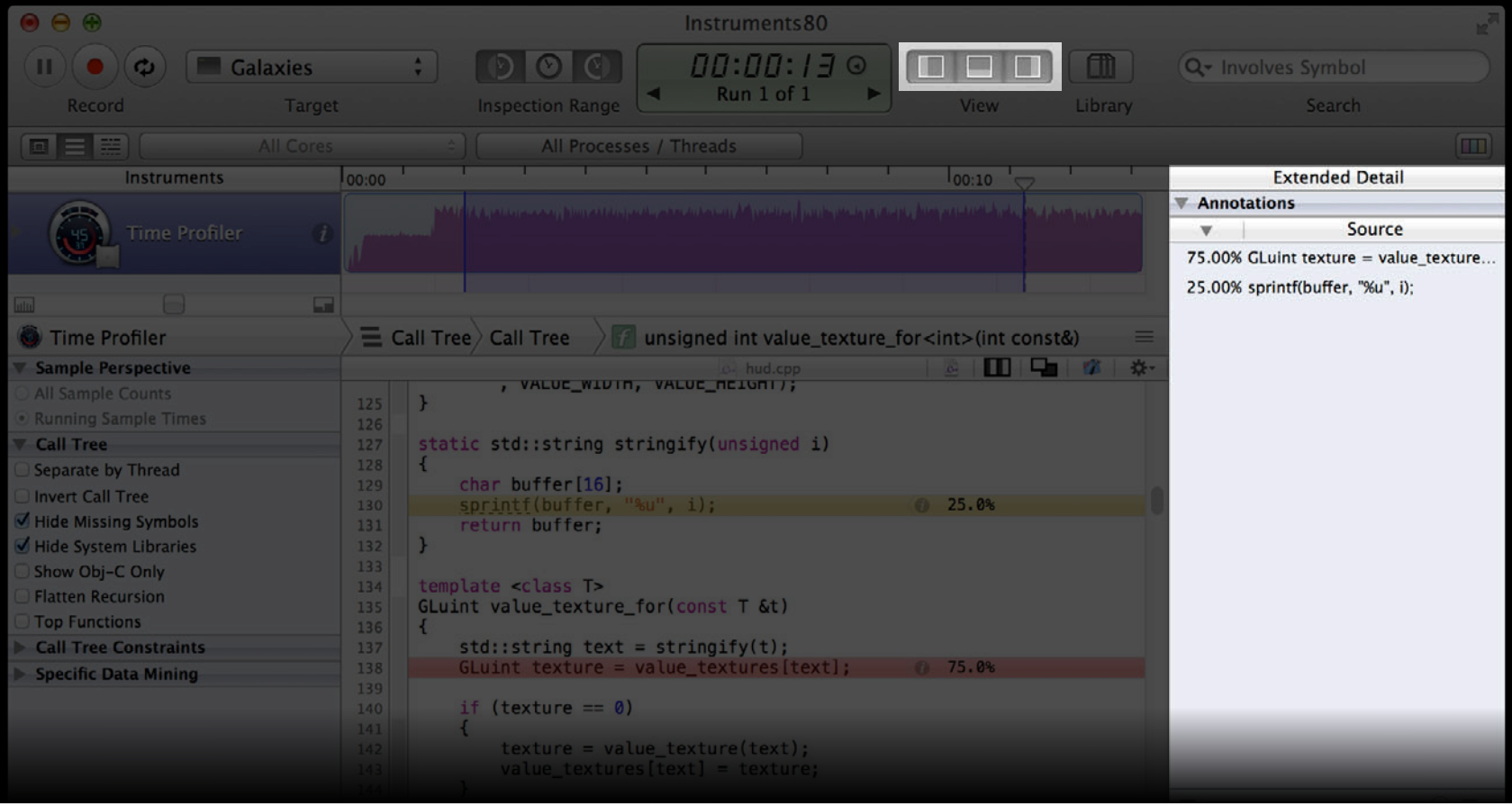
Detail Pane

Source code



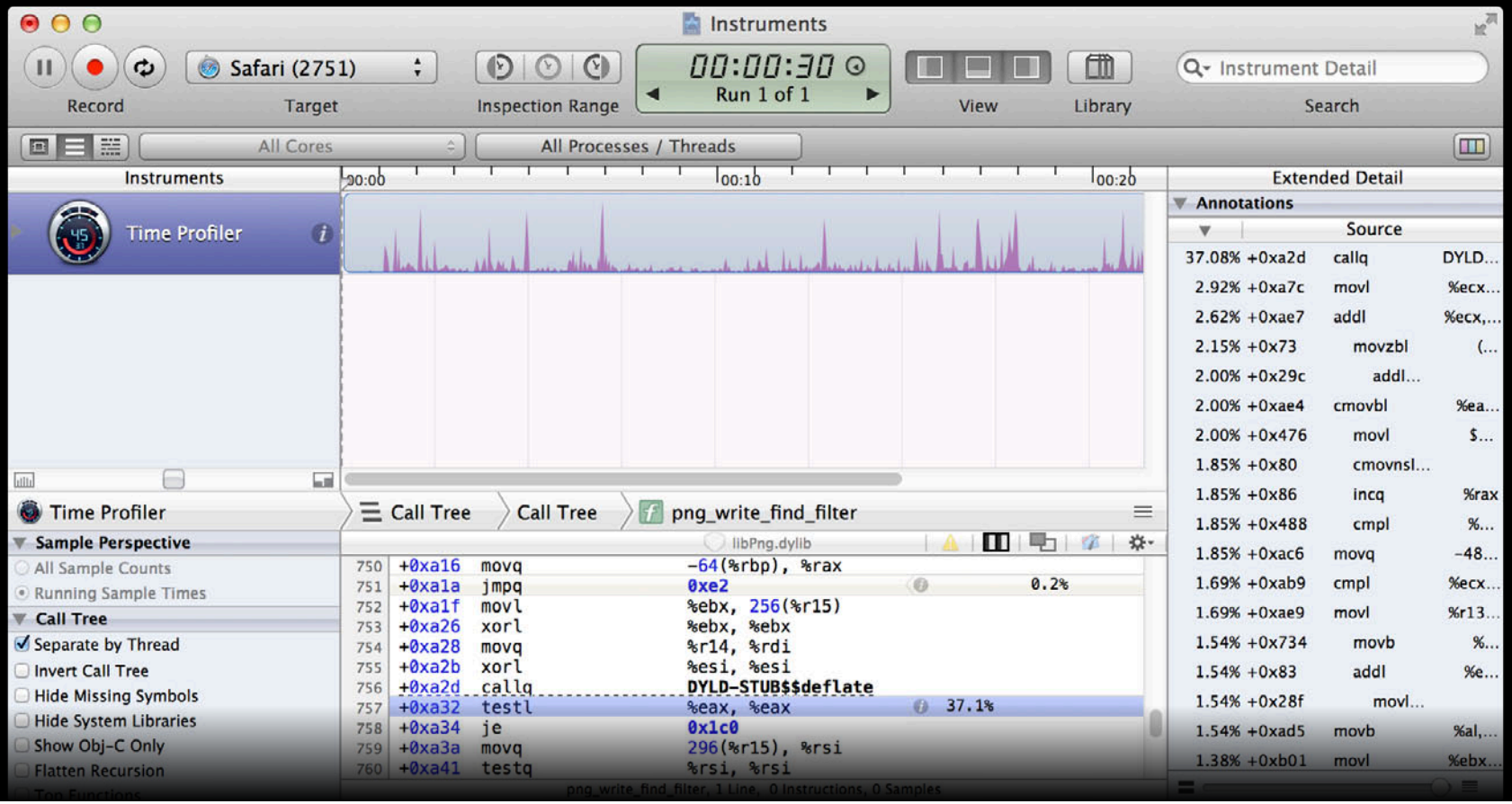
Detail Pane

Source code



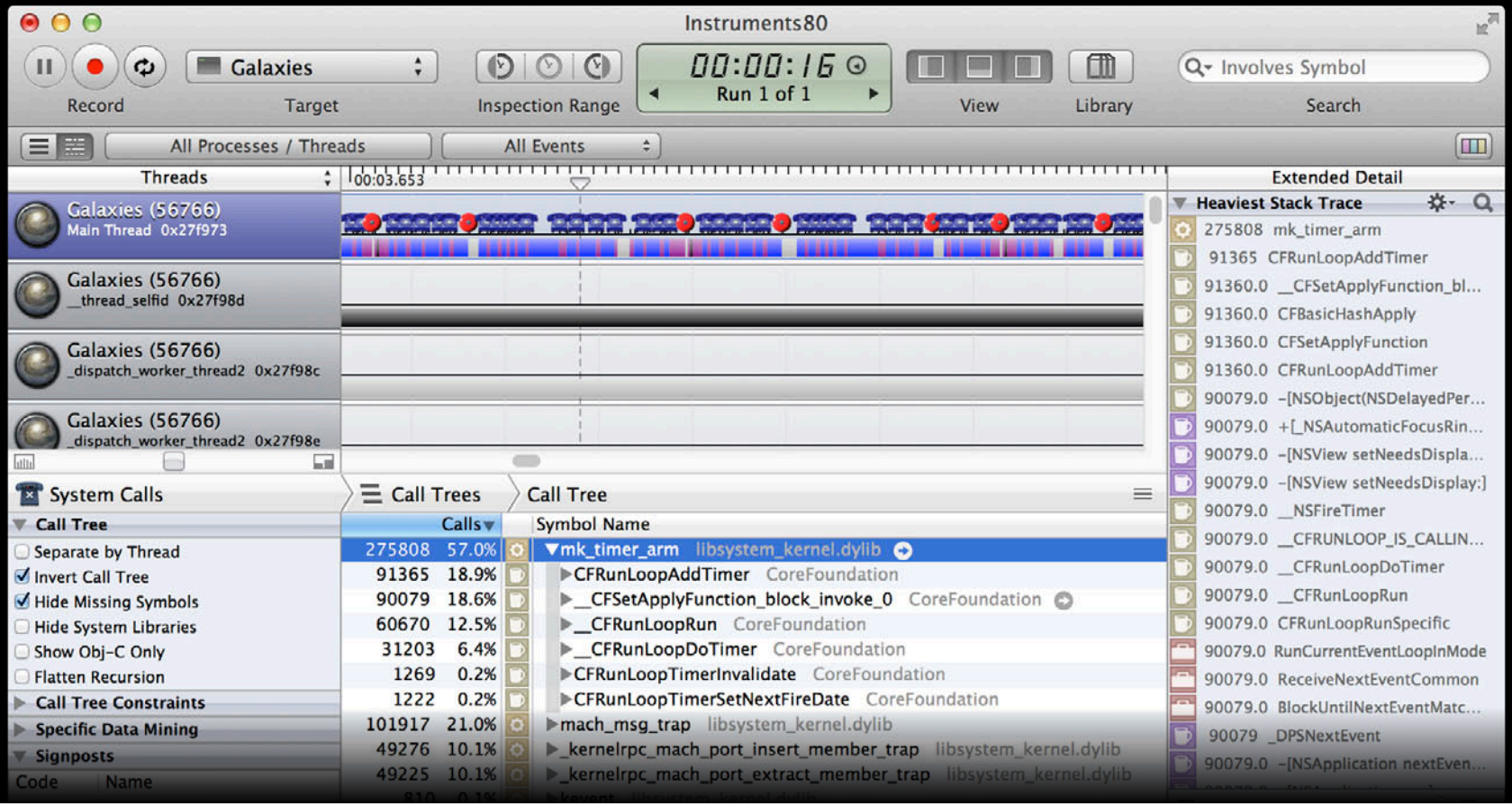
Detail Pane

Disassembly



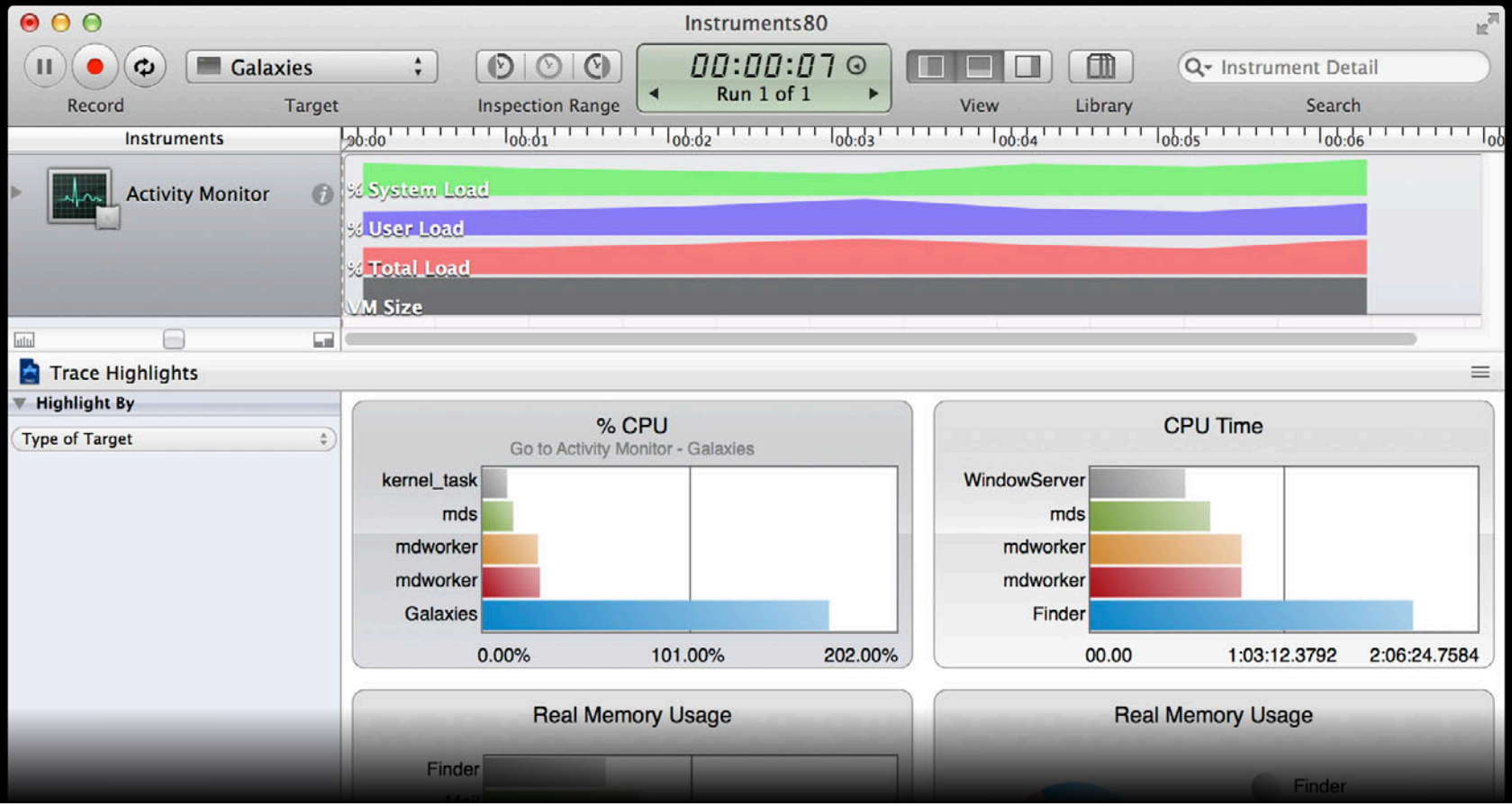
Detail Pane

System Calls

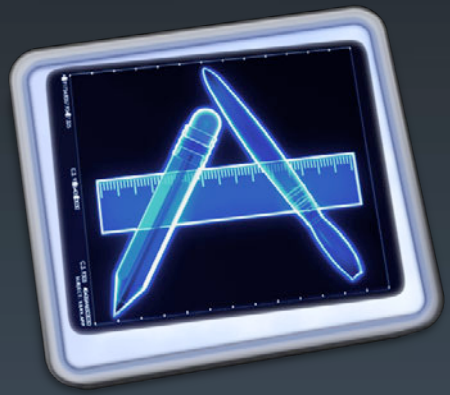


Detail Pane

Activity summary



Instruments

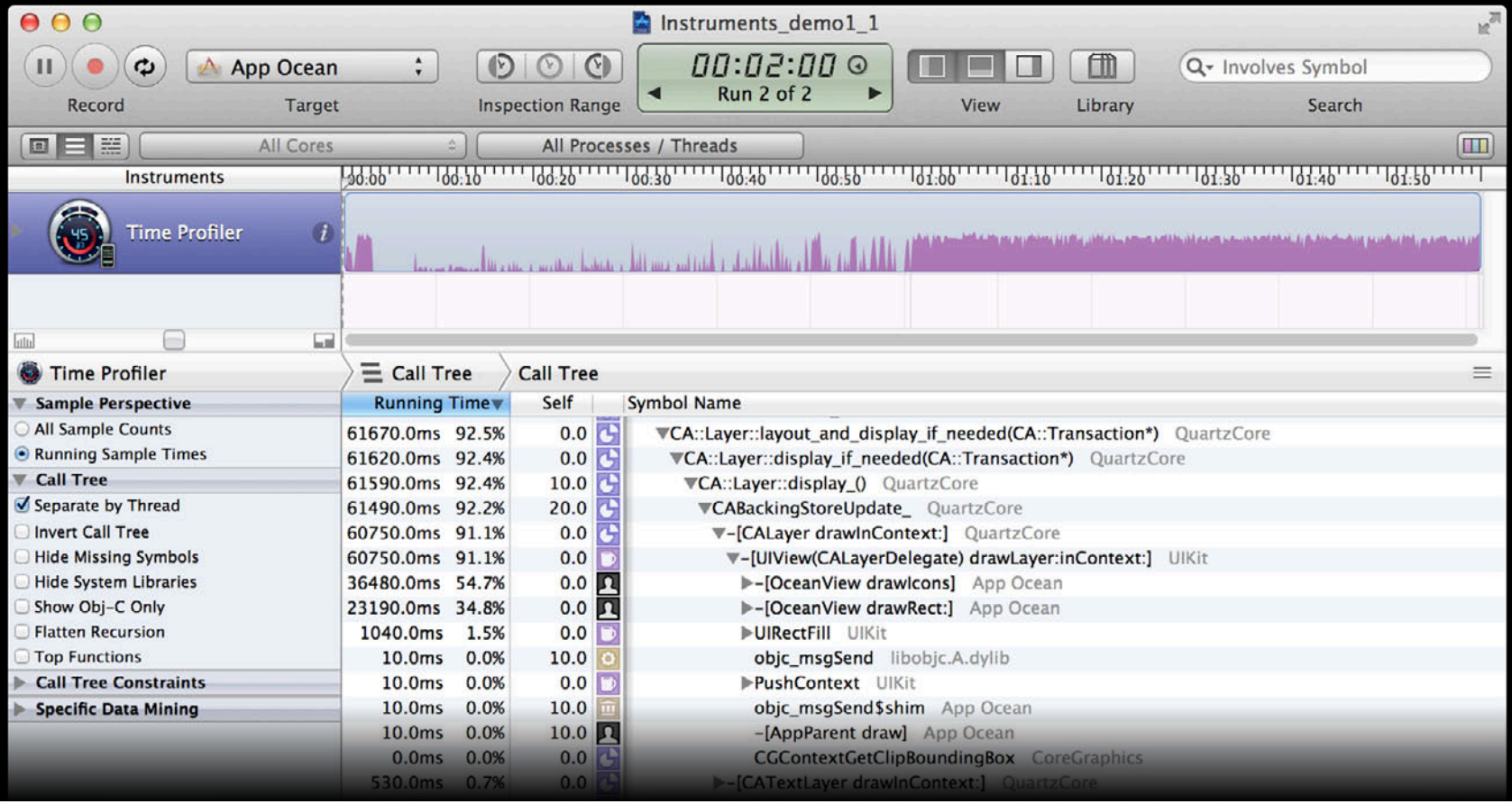


Demo

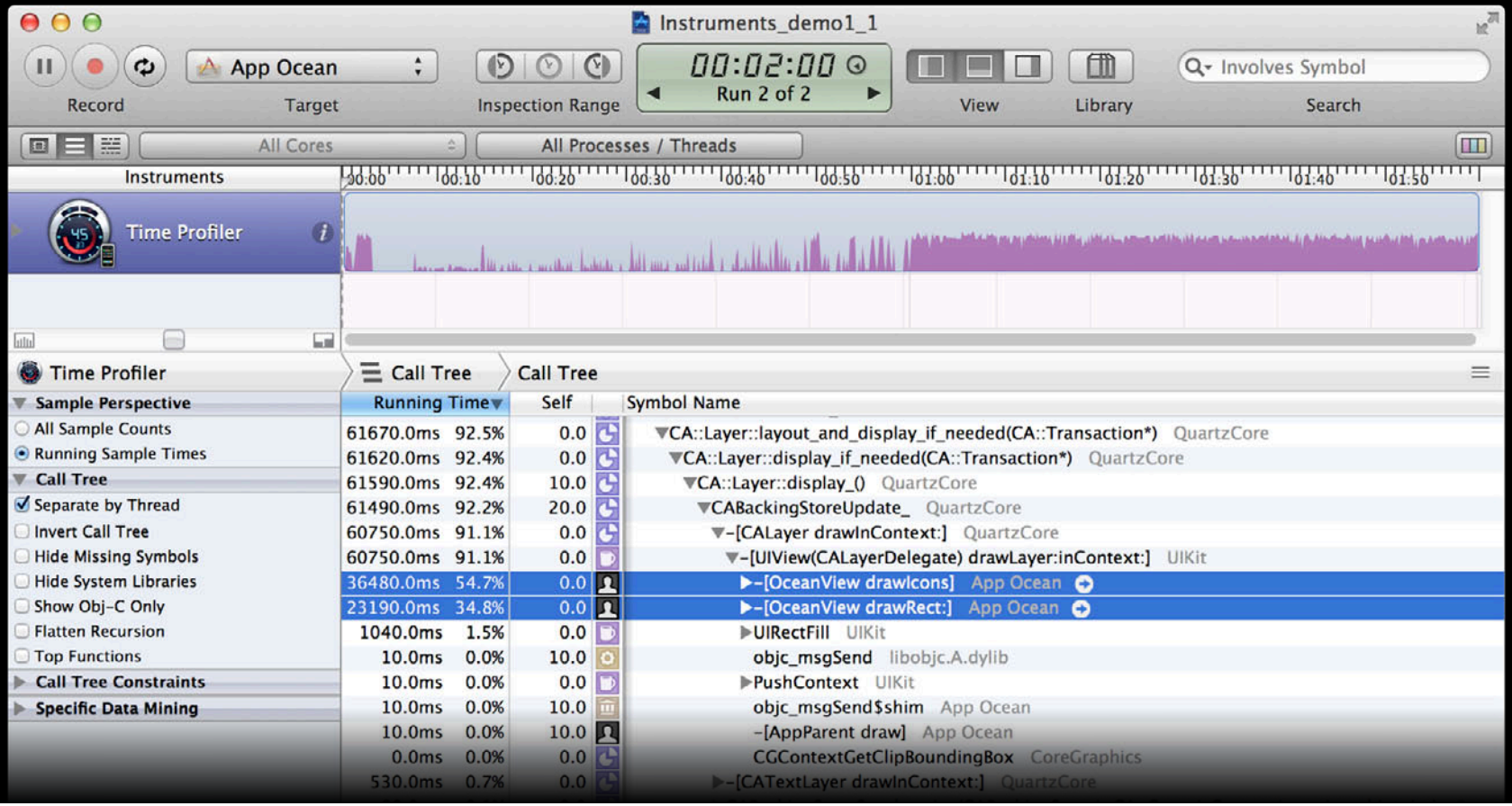
Time Profiler example

Joe Grzywacz
Performance Tools Engineering

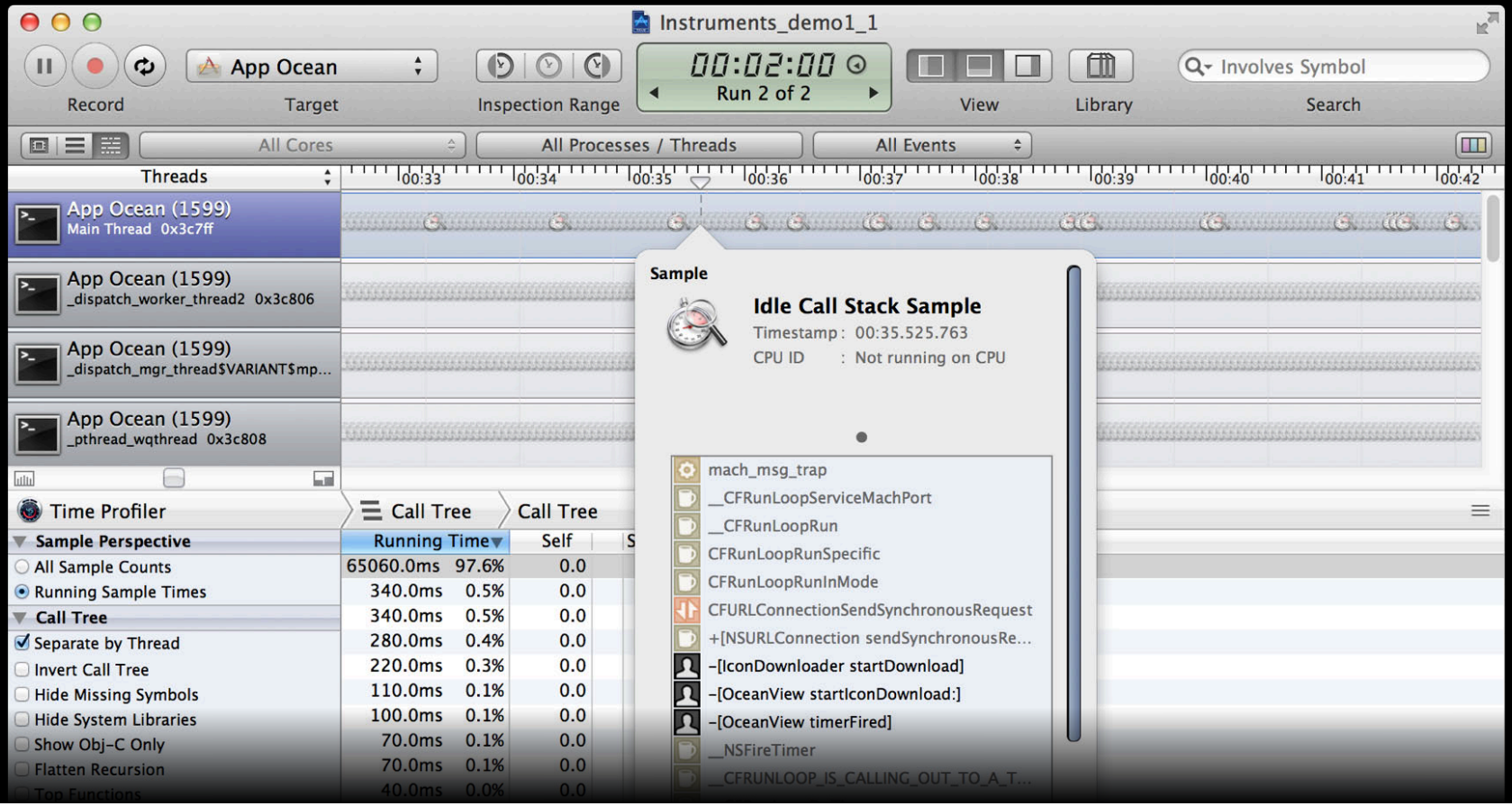
Use Call Tree



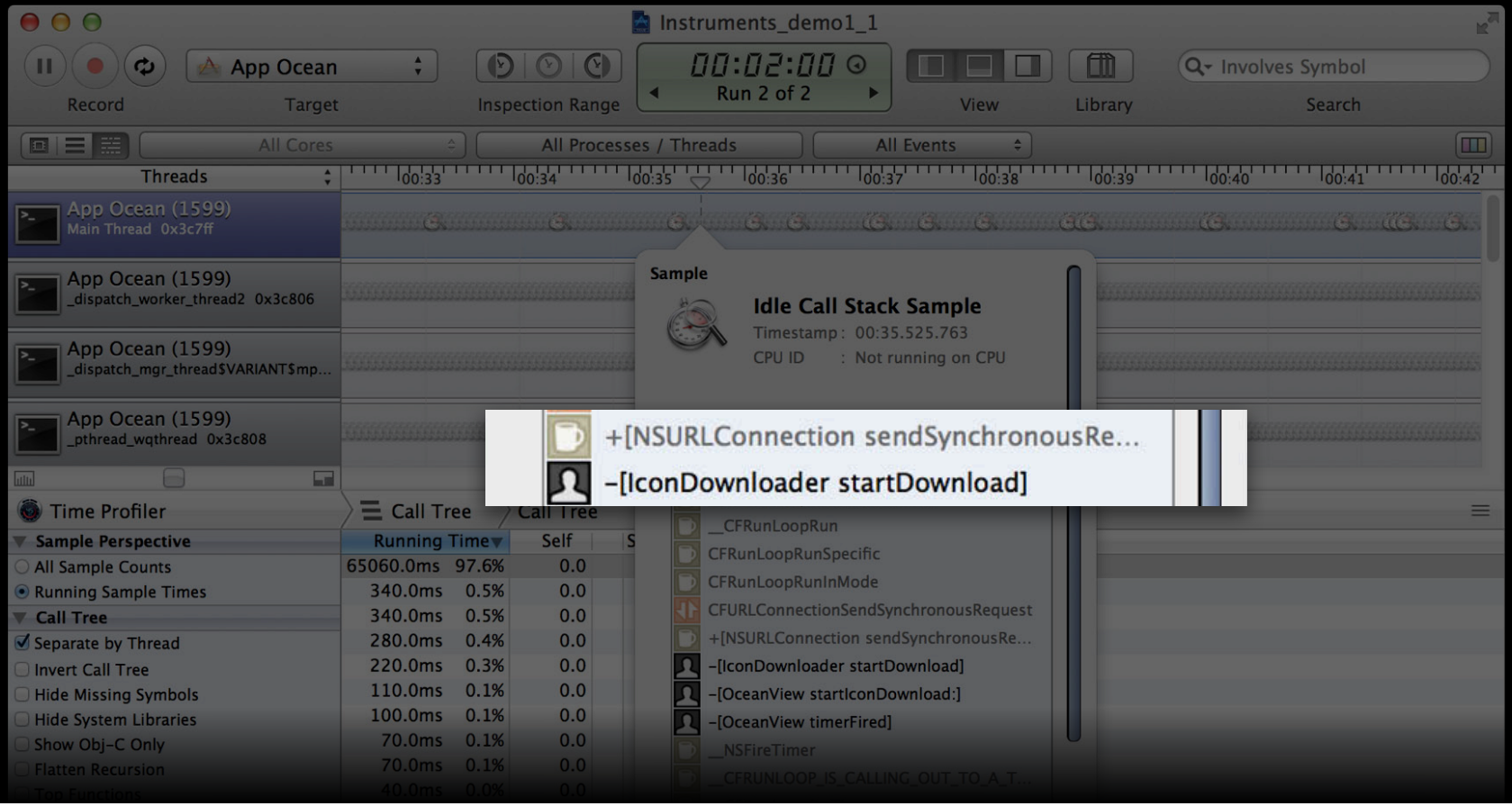
Use Call Tree



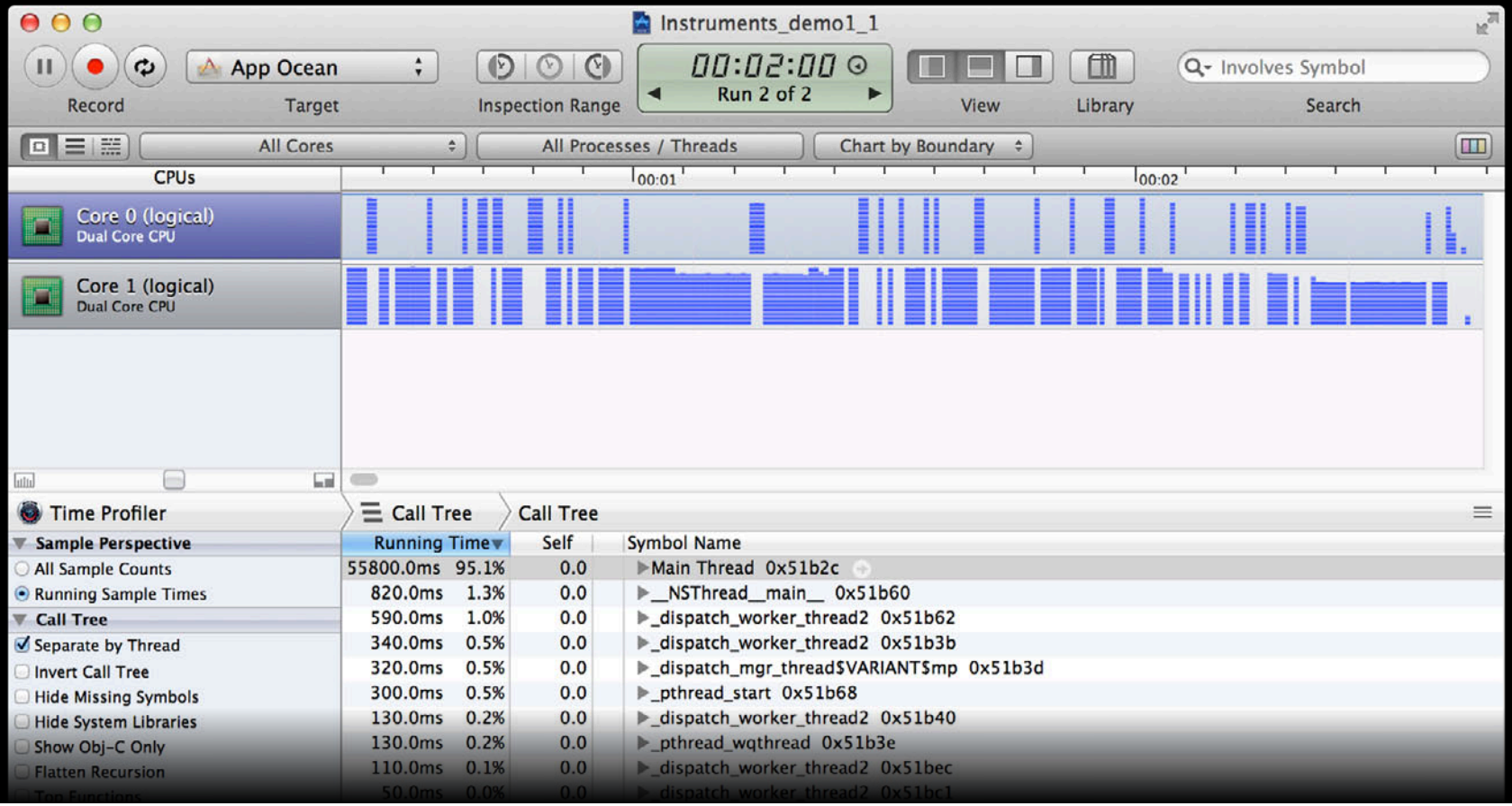
Use Thread Strategy



Use Thread Strategy



Use CPU Strategy

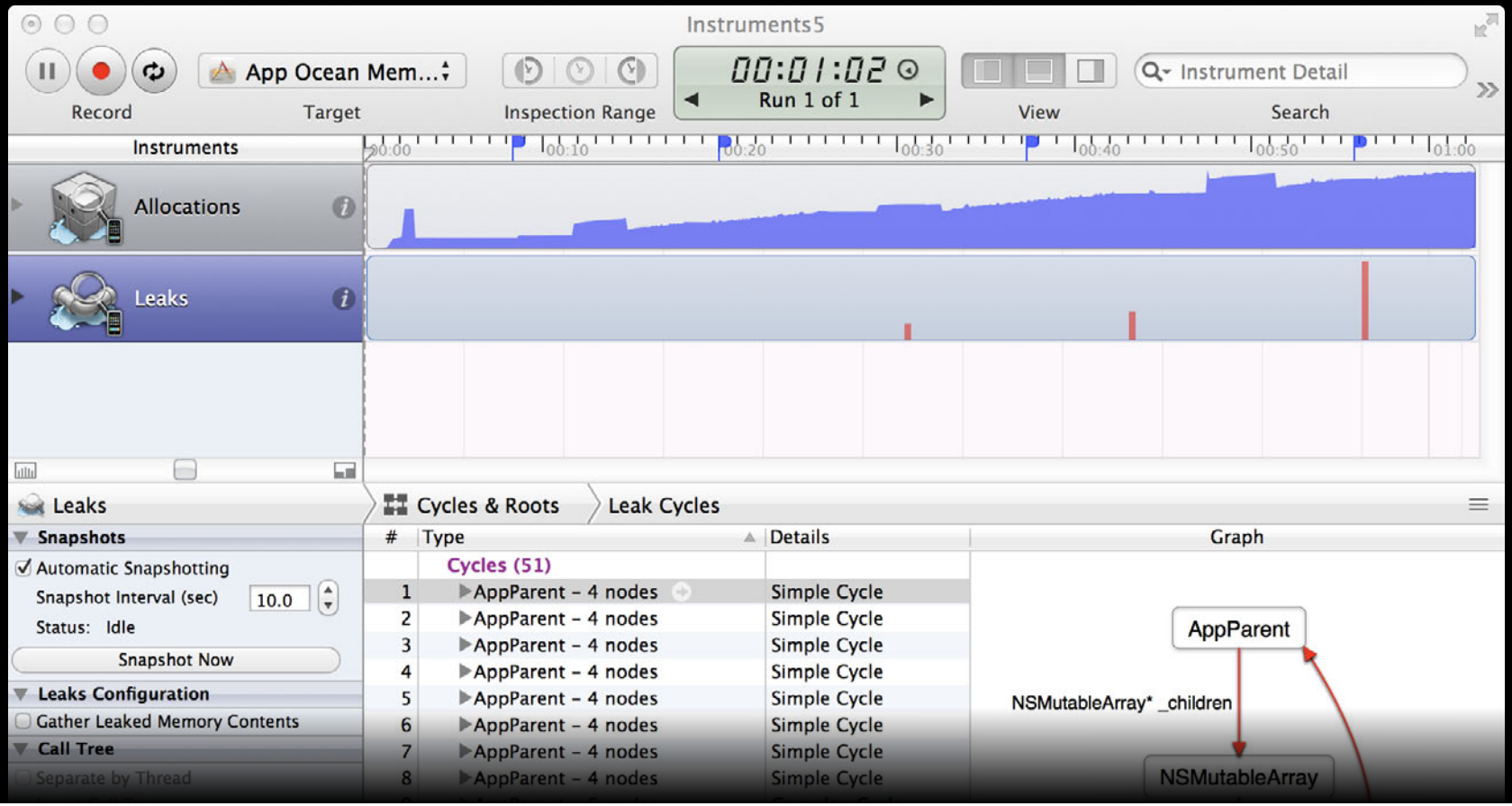


Demo

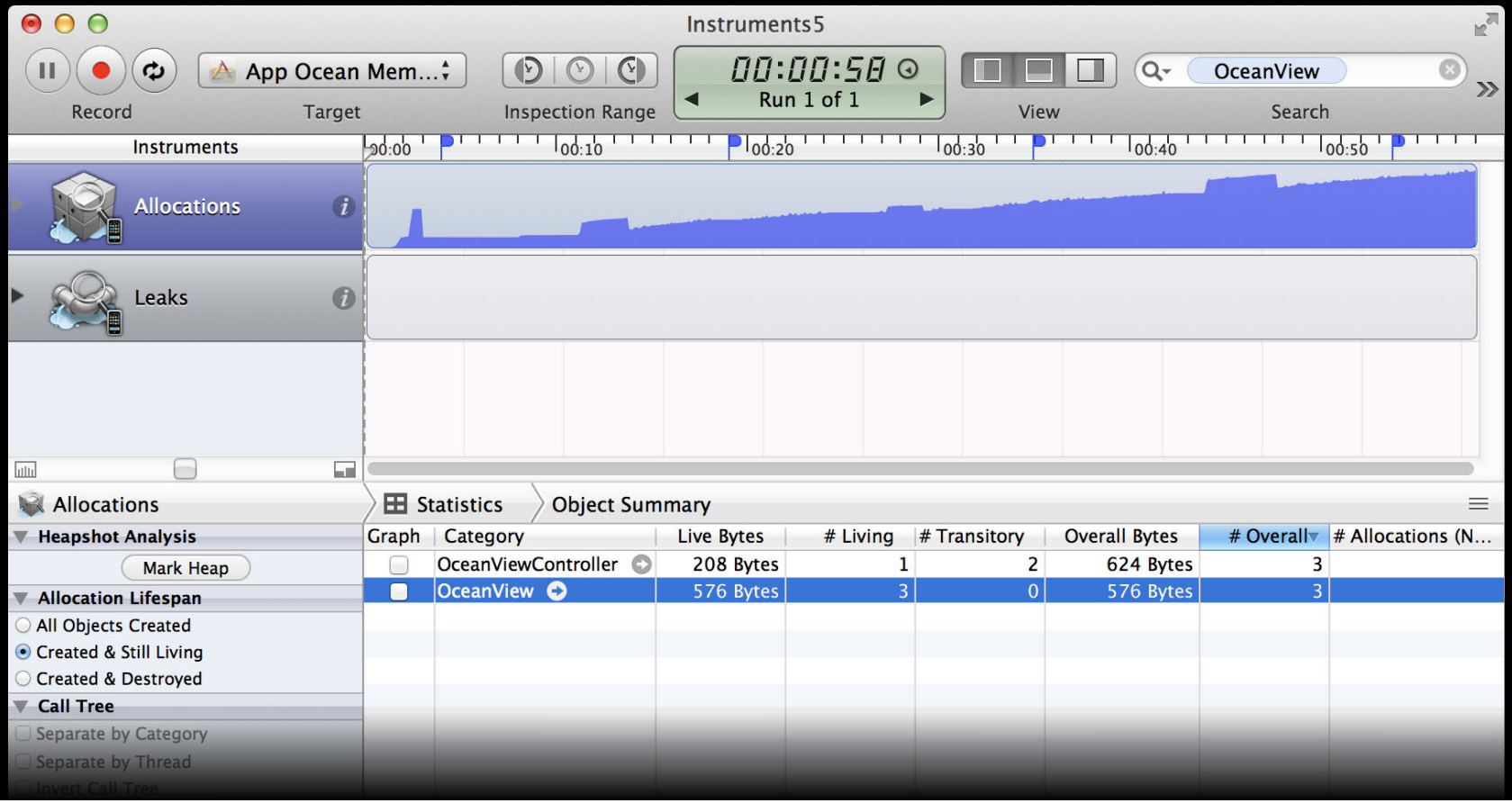
Memory profiling example

Victor Hernandez
Performance Tools Engineering

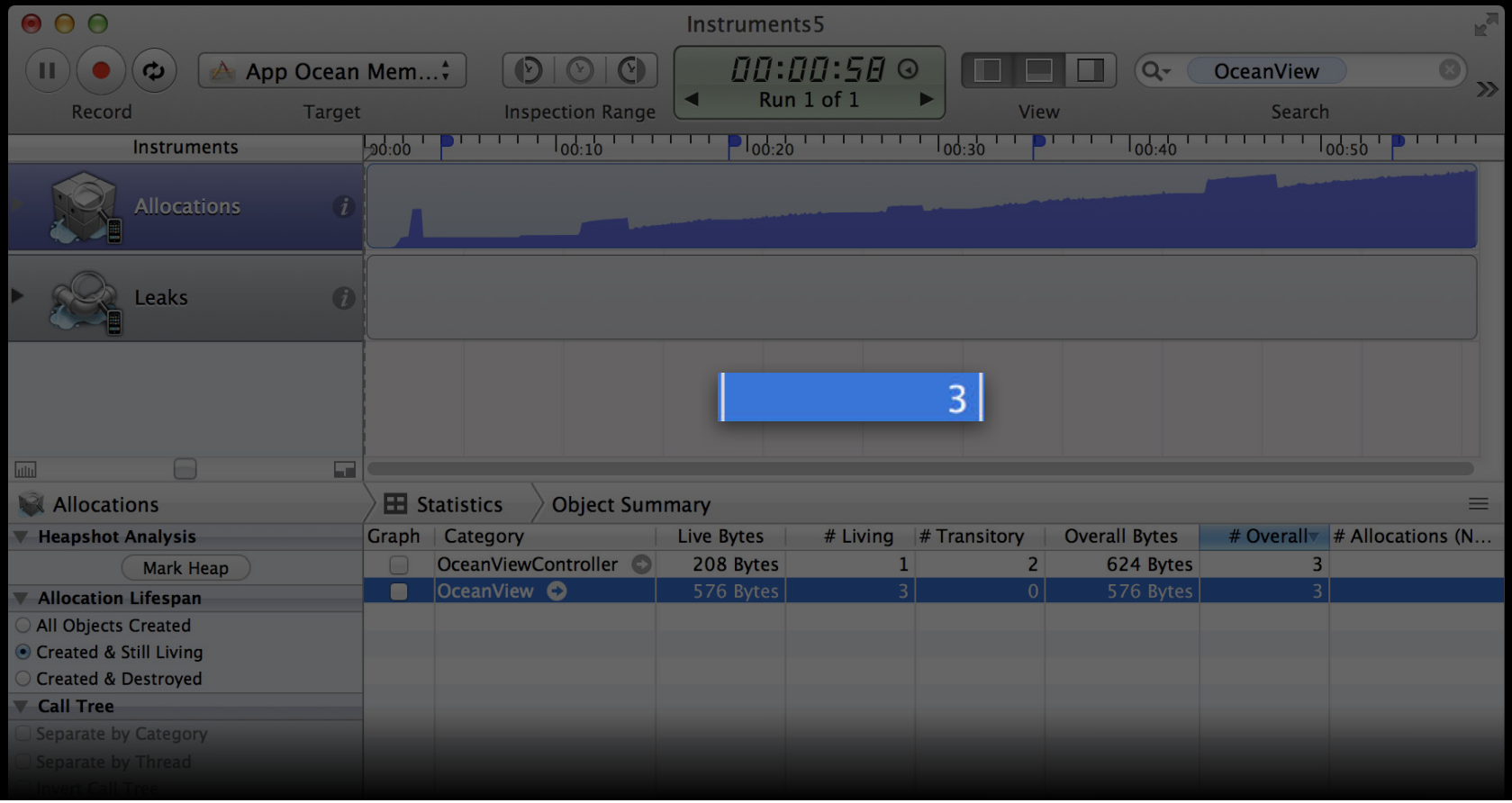
Use Cycles and Roots



Use Allocations



Use Allocations



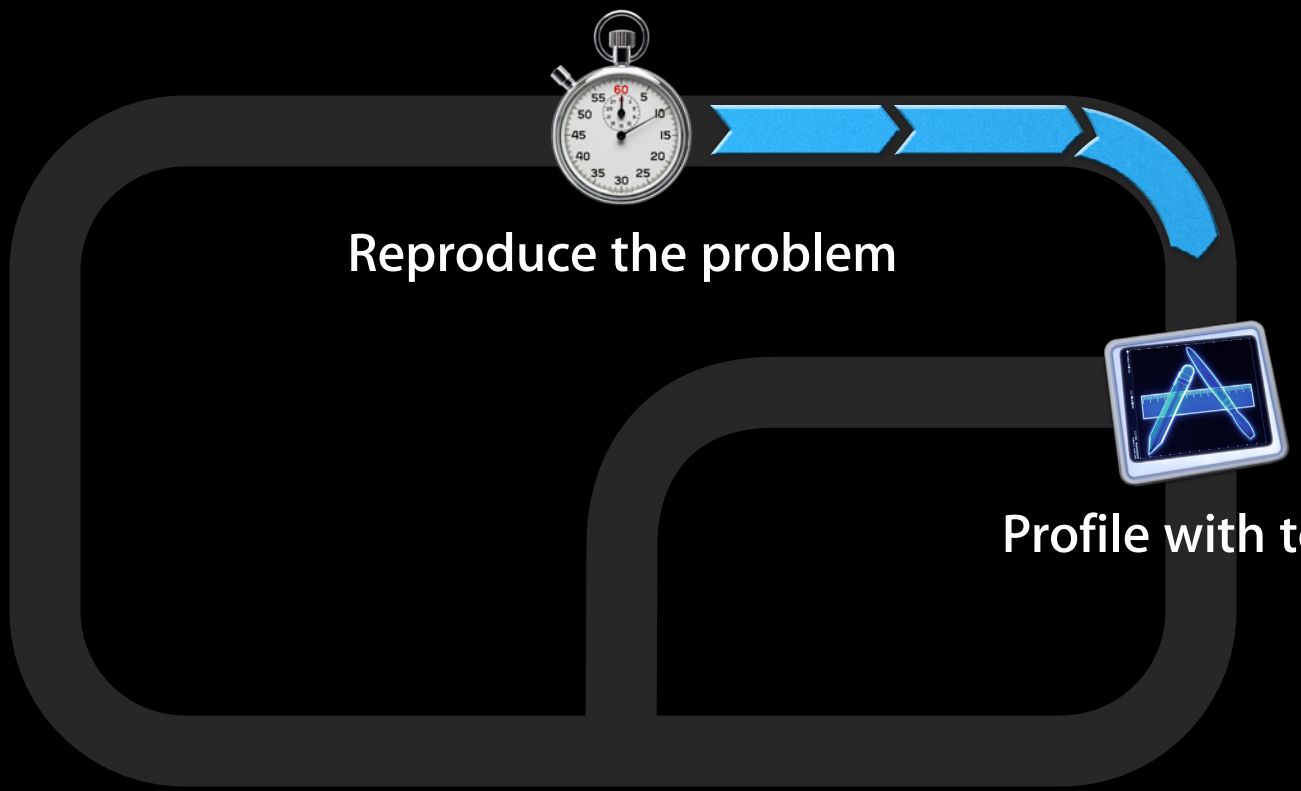
Closing Thoughts…

Profile Process

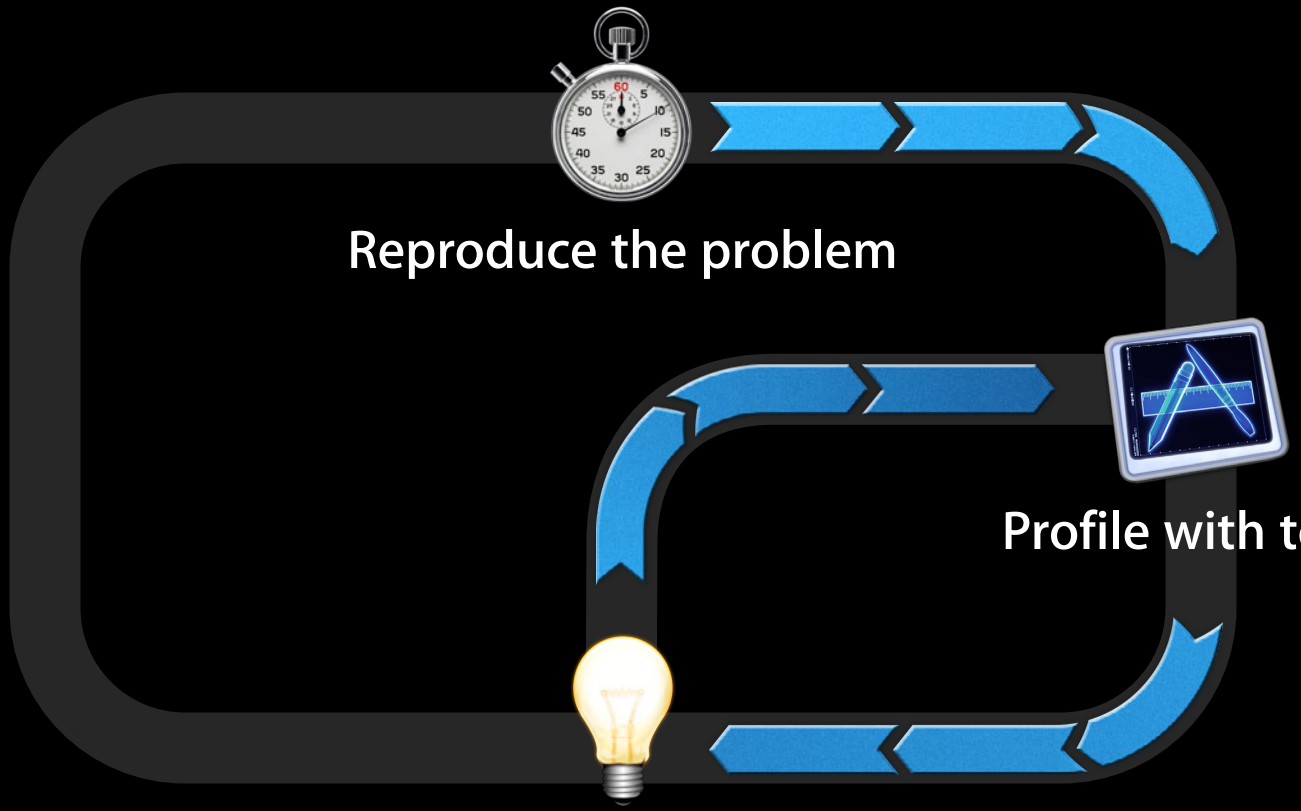
Profile Process

Reproduce the problem

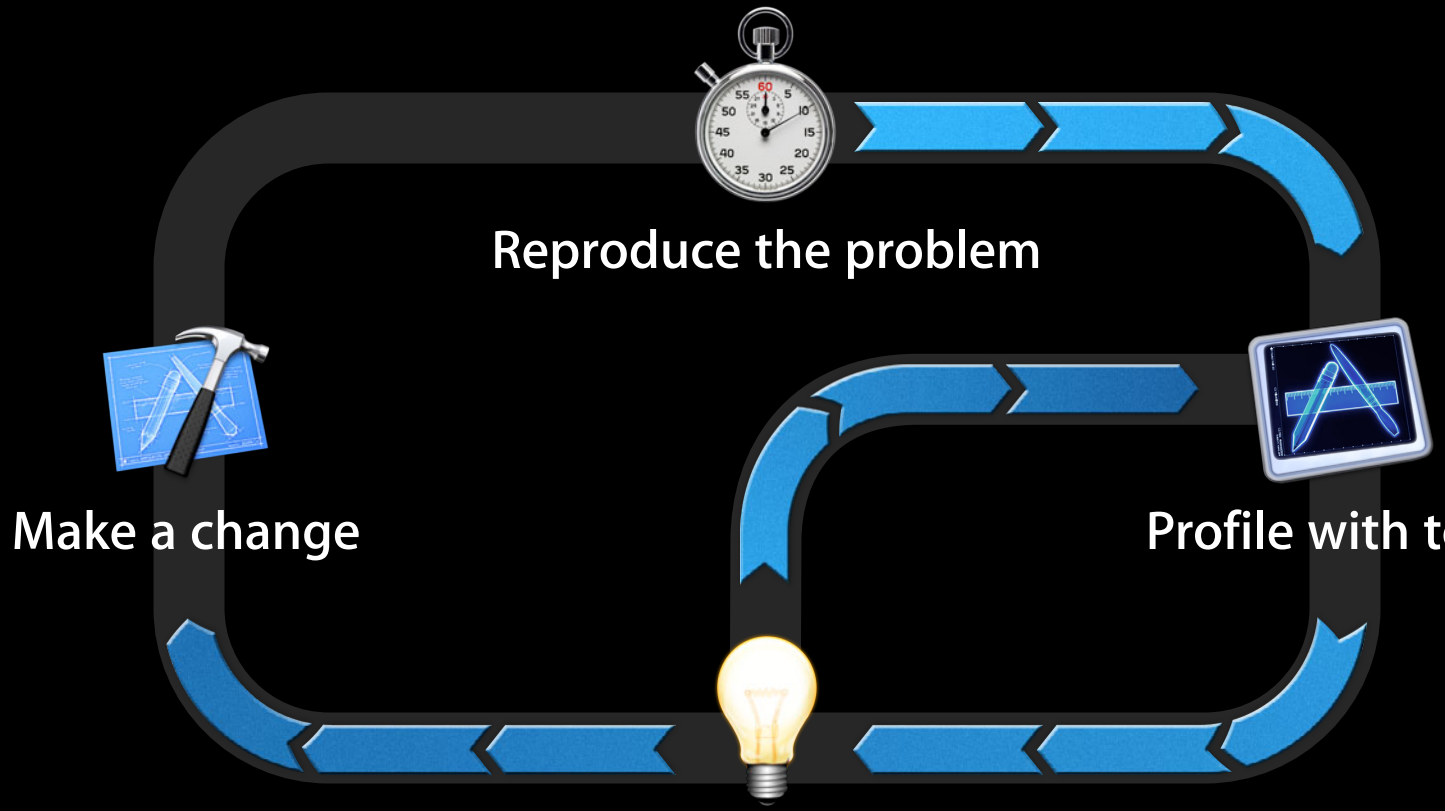
Profile Process



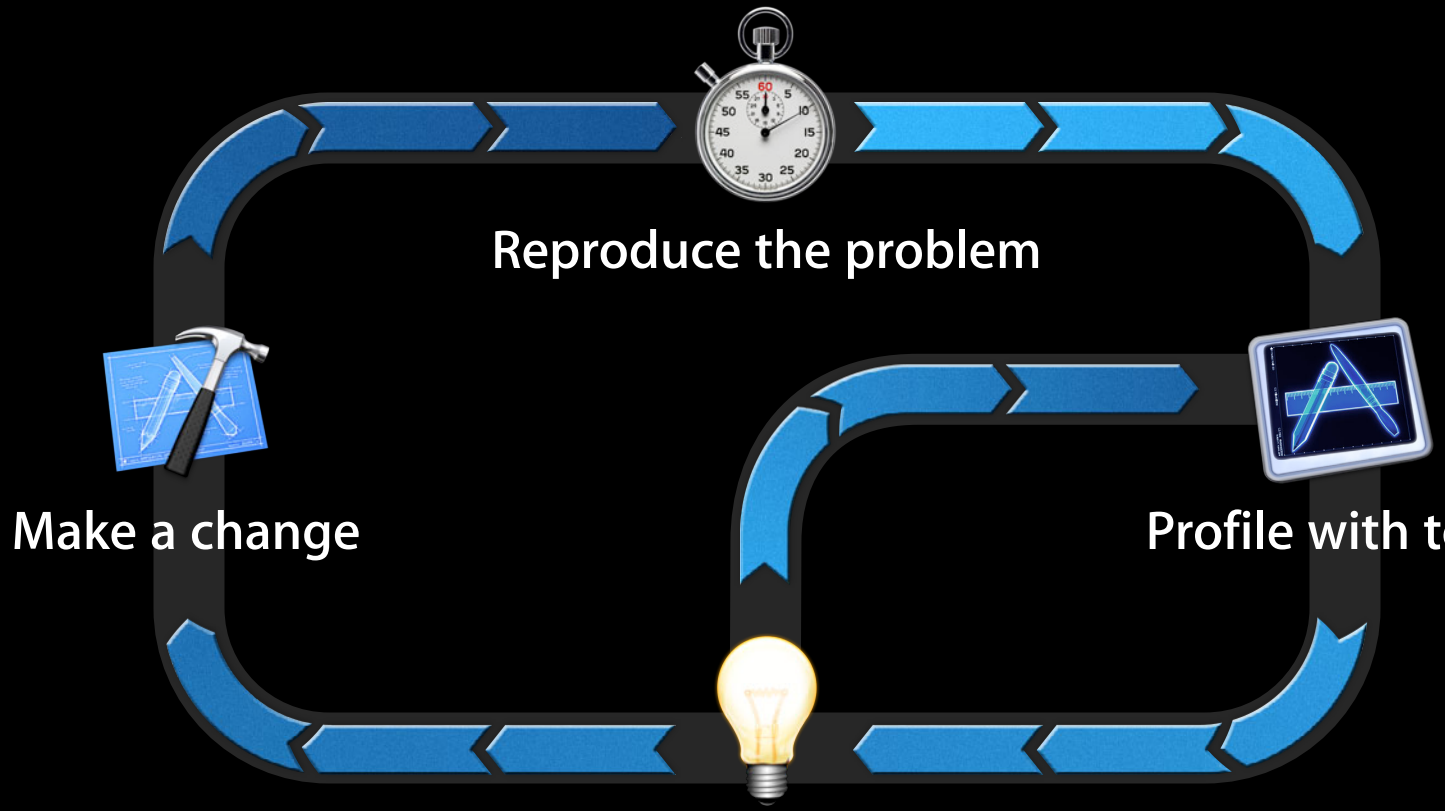
Profile Process



Profile Process



Profile Process



Instruments Templates Used

Instruments Templates Used

3 Improvements

2 Improvements

Can Profile Virtually Anything

Can Profile Virtually Anything

"Fantastic and Fast"

"Must buy this app"

More Information

Michael Jurewitz
Developer Tools Evangelist
jury@apple.com

Instruments Documentation
Instruments User Guide (Xcode Documentation)
Instruments New Features User Guide

Apple Developer Forums
http://devforums.apple.com

Related Sessions

iOS App Performance: Responsiveness	Presidio Thursday 11:30AM
iOS App Performance: Graphics and Animations	Presidio Thursday 3:15PM
iOS App Performance: Memory	Presidio Thursday 4:30PM

Labs

Xcode Lab	Developer Tools Lab B Ongoing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