

Johns Hopkins Engineering

User Experience

Module 3



JOHNS HOPKINS

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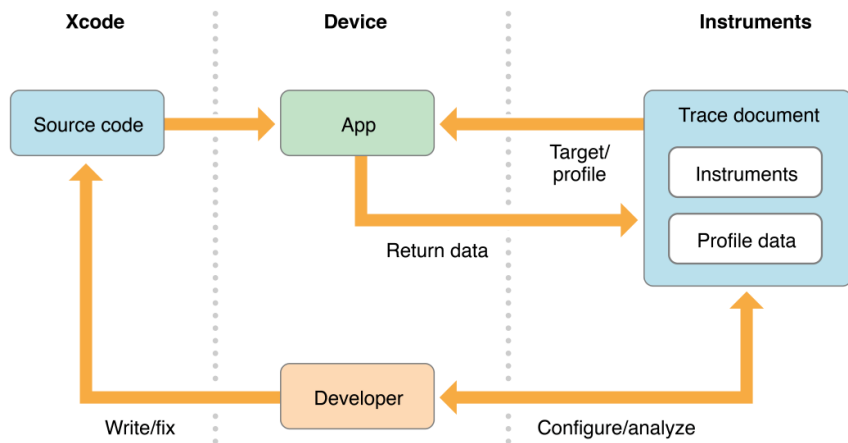
Instruments

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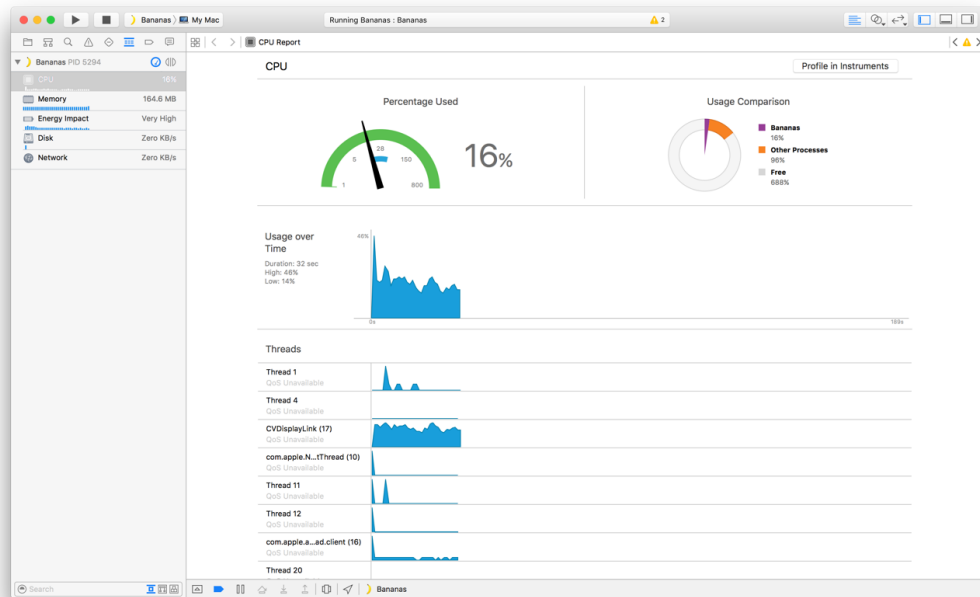
Instruments

- Instruments is a powerful analysis tool that comes with Xcode (but is a separate app)
- You can profile macOS, iOS, watchOS and tvOS apps, processes and devices
- You can profile memory usage, energy usage, networking usage, and more!

Getting Started



Starting instruments is easy – choose your instruments to use, start your app and collect data (top figure)! You can always use Xcode's debug panel first before diving in deep (right figure).



App Performance

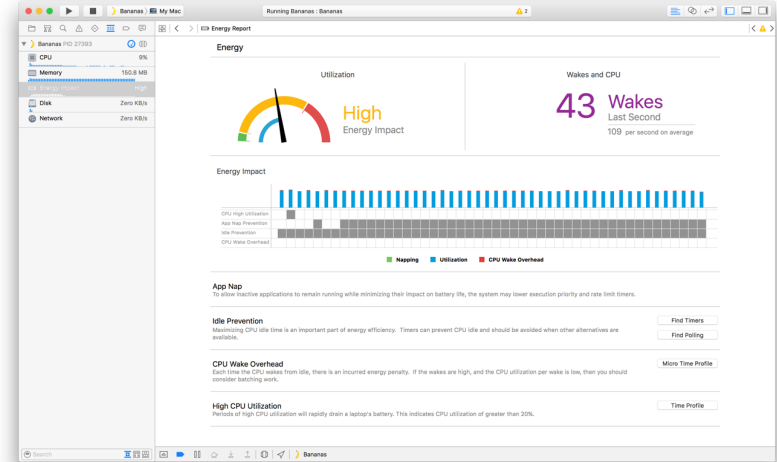
- The Time Profiler Instrument provides low overhead sampling of processes on the system
- The CPU strategy usage view compares the core usage over time periods. Look for unbalanced core usage – you may need to optimize your code!
- Performance Monitor counters, which measure events in the processor, can be examined with the Counters instrument
- The Activity Monitor template can be used to compare CPU usage in comparison to other apps

Memory Usage

- Overall memory use can be examined with Activity Monitor and use the statistics area of the inspector to look at various memory related values
- Leaked memory can be examined with the Leaks profiling template which uses Allocations and Leaks instruments to find memory that has been allocated but no longer referenced
- Abandoned memory can be examined with the Allocations profiling template. You can see if your memory usage continues to grow even though views have been removed from the screen or threads have finished running
- Zombies (objects that are referenced after they have been released) can be addressed with the Zombies profiling template. Here, Allocations is used with the `NSZombiesEnabled` flag.

Energy Usage

- The Energy Impact gauge in Xcode can be used to get a quick idea of your app's energy needs (see the figure to the right).
- If you need to use Instruments to get more details, use the Energy Log instrument. Try to test wirelessly so you can emulate real conditions
- You can also log energy usage directly on the device by toggling Settings > Developer > Logging > Energy, then "Start Recording". Stop when you're done, and then use Instruments to import and examine the log.





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