

# Saam Barati

## Specialties

Virtual Machine architect specializing in compilers, JITs, speculative optimization, runtimes, performance analysis, programming languages, and security

## Experience

**Software Engineer, Verse VM, Epic Games: Sept. 2022 - Apr. 2023**

**Software Engineering Manager, Verse VM, Epic Games: Apr. 2023 - Present**

- Leading a team of 8-10 engineers
- Creating a from-scratch high-performance VM for Verse
- Creating an LLVM-based compiler and runtime to auto-transactionalize C++ code
- Creating a reference interpreter for Verse
- Creating an incremental GC for Unreal Engine
- Integrating Verse with Unreal Engine and UEFN

**Software Engineer, JavaScriptCore, Apple: 2015 - 2022**

**Software Engineering Manager, JavaScriptCore, Apple: Feb. 2022 - Sept. 2022**

- Lead a team of 7-8 engineers
- Created a low overhead and high fidelity sampling profiler and integrated it with WebKit's Web Inspector developer tools
- Wrote the try/catch implementation in the DFG and FTL optimizing compilers
- Extended JavaScriptCore's object model to support polymorphic prototypes in Structure
- Created JS Spectre Proof of Concepts as part of Spectre defense research
- Created the JetStream2 JavaScript benchmark used both by Apple and the wider industry
- Created a new version of the Safari Page Load Test benchmark used by Apple, notably creating a framework for capturing and replaying modern web content
- Ported JavaScriptCore and parts of WebKit to Arm64 Macs
- Fixed over 100 security bugs in JavaScriptCore and did variant analysis to ensure the root causes were resolved
- Implemented efficient Map and Set JavaScript data structures, and integrated their operations into the DFG and FTL optimizing compilers
- Enhanced JavaScriptCore's inline caches to support polymorphic property name accesses
- Helped bring up the Web Assembly implementation in JavaScriptCore
- Wrote a Web Assembly baseline compiler in JavaScriptCore
- Enhanced the FTL's Loop Invariant Code Motion to speculatively hoist type checks
- Mentored 3 interns in JavaScriptCore and 2 interns from other teams in WebKit. Mentored 2 engineers on JavaScriptCore. (Prior to becoming manager.)
- Provided architectural guidance on many new JavaScriptCore features
- Over 1300 commits and 2200 patch reviews in JavaScriptCore/WebKit

**Software Engineer Intern, JavaScriptCore @ Apple - 2014**

- Created a value type profiler in JavaScriptCore and integrated it with WebKit's Web Inspector developer tools

## **Education**

University of California Berkeley – BA in Computer Science, 2015

## **Blog Posts & Talks**

- [A design overview of JavaScriptCore's DFG IR](#), Saam Barati, ECOOP 2022
- [Introducing the JetStream2 Benchmark Suite](#), Saam Barati and Michael Saboff, Mar 2019
- [Benchmarking WebKit](#), BenchWork 2018 at ECOOP, Jul 2018
- [JSC Loves ES6](#), Saam Barati, Yusuke Suzuki, and Filip Pizlo, Jun 2017
- [Introducing JSC's New Sampling Profiler](#), Jun 2016
- [JavaScript Type and Code Coverage Profiling](#), Aug 2015

## **Skills & Expertise**

- C and C++
- x86 and Arm64 assembly
- Programming language implementation
- Interpreters
- Compilers
- JITs
- Efficient runtimes
- Concurrent programming
- Security analysis
- Performance analysis
- Benchmark creation
- Mentorship and management

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