Zen - What is it?

- AMD’s new and unreleased cpu architecture
- No longer using “modules” and instead using full cores
- New shorter pipeline
NEXT-GENERATION, HIGH-PERFORMANCE X86 CORE

“ZEN”

- Totally New High-performance Core Design
- Simultaneous Multithreading (SMT) for High Throughput
- New High-Bandwidth, Low Latency Cache System
- Energy-efficient FinFET Design Scales from Client to Enterprise-class Products
- Availability in 2016
### Benchmarks

**GeekBench 3 (Multi-core)**
- Core i5 4590: 10,601
- FX 9590: 13,818

**GeekBench 3 (Single core)**
- Core i5 4590: 3,345
- FX 9590: 2,549

**Zen?**
- FX 9590: 19345?
- FX 9590: 3569?
Bulldozer vs Intel Pentium

- Same concept of using long pipelines and banking on higher frequencies
- Intel abandoned its 31 stage pipeline from Pentium 4 and used a 14 stage pipeline with Pentium D.
- AMD is now abandoning the long pipeline used in Bulldozer for a shorter pipeline in Zen.
First generation Bulldozer shows very little improvement over previous architecture despite long development time

AMD claimed that Bulldozer had a lot more room for improvement than the K10 architecture
Improvements made on Bulldozer

- Larger L1 Cache with no sacrifice in latency
- Better fetch and decode units
  - 30%+ more operations per cycle issued
  - 20%+ less mispredicted branches
- Faster cache miss handling
- More performance per watt
- Still only beats Intel on price point, and even then lags behind in single threaded performance
Zen vs. Excavator

- Moving away from “modules” and using full cores
- No need for shared L2 cache
BUILDING A “ZEN”-BASED QUAD CORE UNIT

- Four cores form a unit, share common L3 cache
- Multiple units can be combined for even greater performance
- 512 KB L2 cache per core, 8MB L3 cache per unit
- High speed interconnect links multiple units together
- Fully inclusive cache design for high performance, low latency
- Design enables various possibilities from high performance to low power