Overview

- What is a supercomputer?
- Watson’s Hardware
- Watson’s Software
- Real-world uses of Watson
Supercomputers

- A computer with a high-level computational capacity
- Used for scientific and engineering applications
- Performance of supercomputers is measured in FLOPS
- IBM is the largest supercomputer vendor with a total of 153 systems.
Hardware Specs

- 90 IBM Power 750 servers
  - 3.5 GHz POWER7 8-core processor
  - 4 Threads per core
  - 2880 simultaneous threads
- 16TB of RAM
- 80 TeraFLOPS
- 500GB/sec or 1 million books/sec
- $34500 per Power 750 server
- ~$3 million worth of hardware
IBM POWER7 Architecture

- Superscaler Symmetric Multiprocessor
- Processor designed for supercomputers
  - Hardware-coherency fabric of up to 256 CPUs
- Cache
  - L1 cache
    - 32KB/core
  - L2 cache
    - 256KB/core
  - L3 cache
    - 32MB accessible by all cores
    - Embedded DRAM (eDRAM)
IBM POWER7 Architecture

- Simultaneous Multithreading
  - POWER7 offers 3 types
    - 1,2,4-way SMT
  - Intelligent Threading
- Flexible processor packaging
  - TurboCore mode
  - MaxCore mode
- Two DDR3 memory controllers
  - 4 channels each
  - Operates at 6.4GHz
  - Address up to 32 GB of memory or a total of 256 GB with all channels
Software Specs

- IBM’s DeepQA
  - Hypothesis Generation
  - Hypothesis Scoring
- Apache UIMA
  - Unstructured Information Management
- SUSE Linux Enterprise Server
- Apache Hadoop
- Mostly written in Java, C++ and Prolog
Why was Watson created?

- IBM research manager Charles Lickel watched Jeopardy at a restaurant.

- Thought the challenge of playing Jeopardy with an IBM system was unique.

- IBM research executive Paul Horn backed Lickel up and pushed for the department to take up this challenge.

- By 2006 Watson was up and running, “learning” new information to prepare for the challenge.
Jeopardy Challenge

- In 2008, a challenge was set up between Watson, Ken Jennings, and Brad Rutter.
- In 2010, mock set was created, tests were run.
- On January 13th 2011, a 15 question practice match was conducted.
- On January 14th 2011, the official matches were run.
- The first match wasn’t aired until February 14th 2011.
Jeopardy Challenge

• Watson hunted for Double Jeopardy questions.
• Watson won the first match despite incorrectly answering two questions.
• Watson duplicated Jennings incorrect response.
• Incorrectly answered the final jeopardy question.
Moving forward with Watson

- January 19th 2014, IBM Watson Group formed to develop new cloud delivered services.
- IBM partner program Chatterbot.
- Teaching Assistant at Georgia Tech
- August 2016, Watson used for weather forecasting