A New Generation SSD for Big Data Applications

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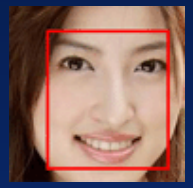
Big Data needs Smart Storage

- Why now:
  - Massive quantities
  - Geographically distributed
  - Real time
  - Unstructured
  - Visual content

Big Data needs Smart Storage



- Imagine:
  - Store file IF not already there
  - Save post IF reflects client negativity
  - Retrieve image IF it shows a defective part
  - Retrieve audio file IF contains glass breakage
  - Save video frame IF a person is identified
  - Compress and save video IF suspicious activity

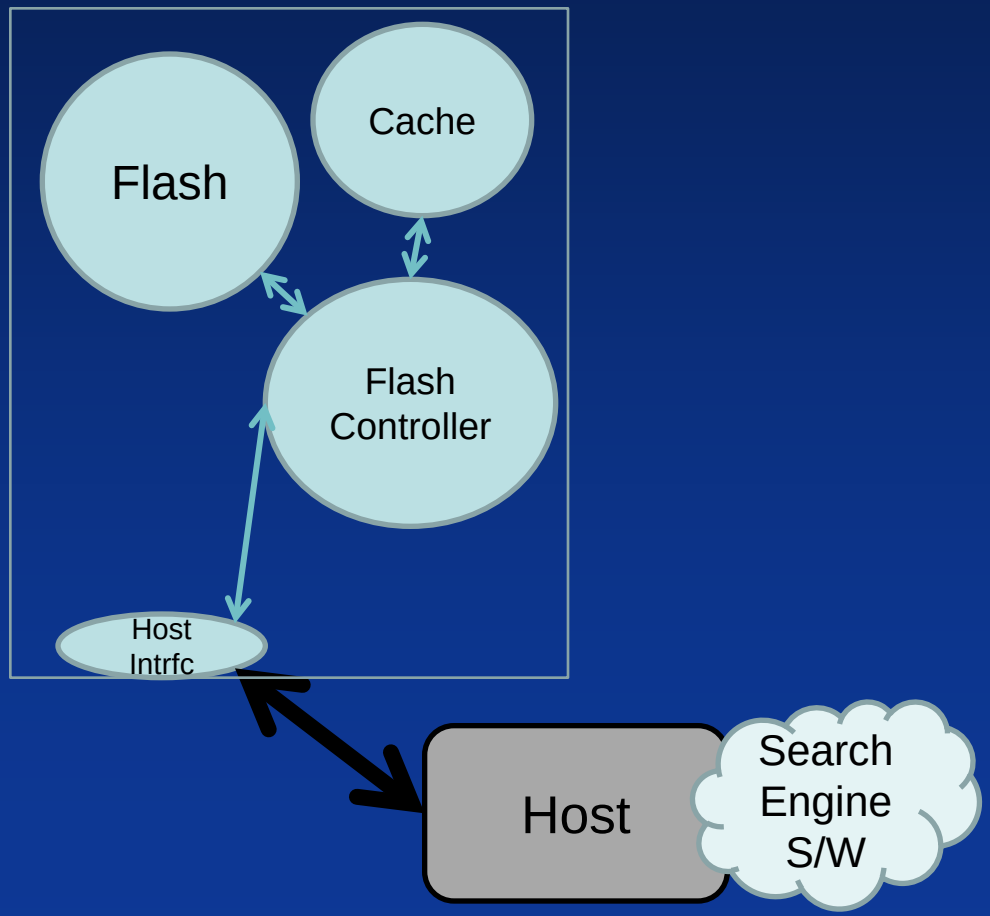
Big Data needs Smart Storage SSD

- Manage Flash for life and reliability:
  - In-line de-duplication
  - Map Blocks/Files

- Amdahl's Law ⇐⇒ Moore's Law
  - Limits of multiple processors

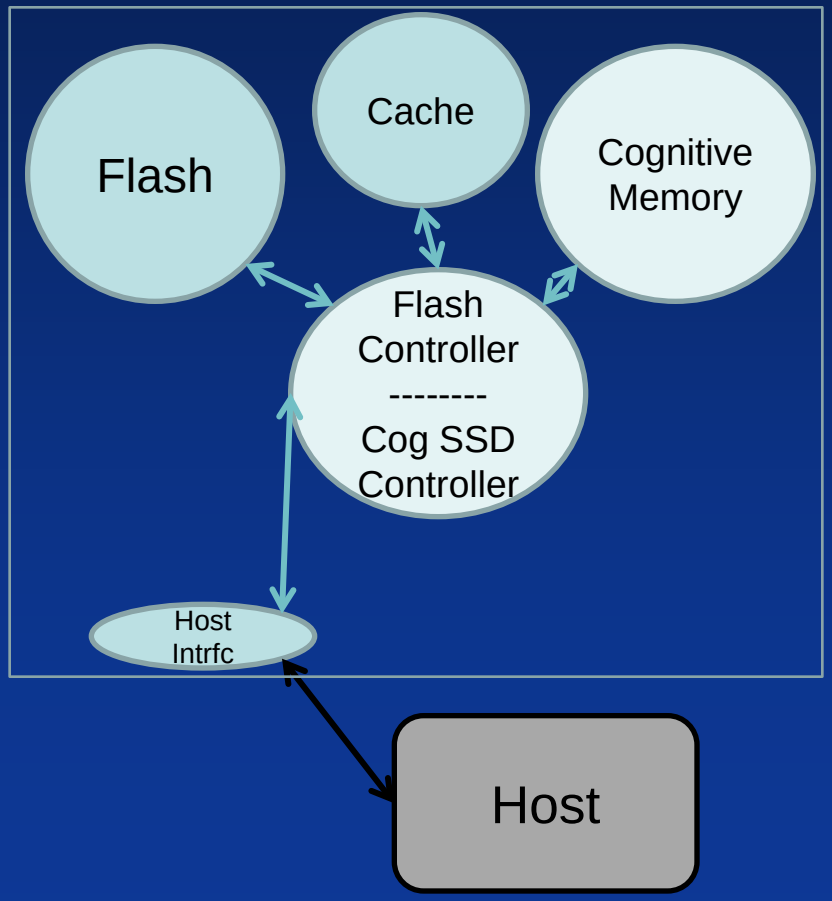
The Concept…

1. Today's SSD

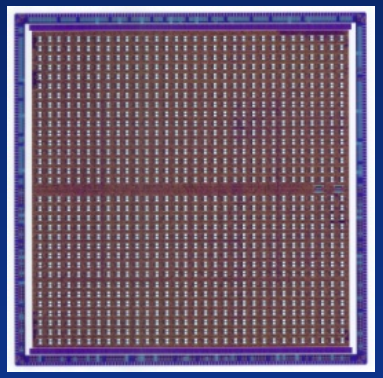


…The Concept

2. Smart SSD



The Enabling Technology Cognitive Memory

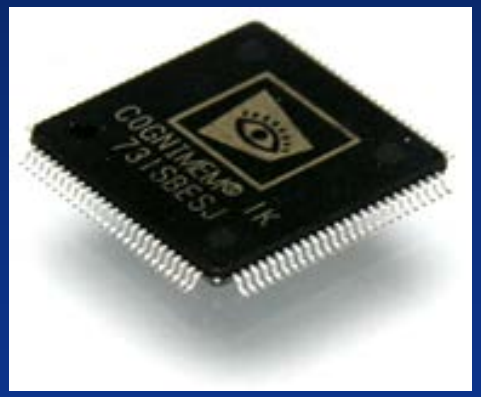


- Pattern-matching chip
  - Massively parallel operation
  - In memory processing logic
  - Latency independent of size
  - Exact and probabilistic matching
  - High speed – low latency
  - Low power
  - Moore's Law amenable

Is It Real?

IBM ZISC

CM1K



The Value Proposition…

1. In-Memory Processing

   - H/W-accelerated searching
   - Off-loads host server
   - Scales practically w/o limit
   - Super computer performance

…The Value Proposition

2. Ultra-low power draw

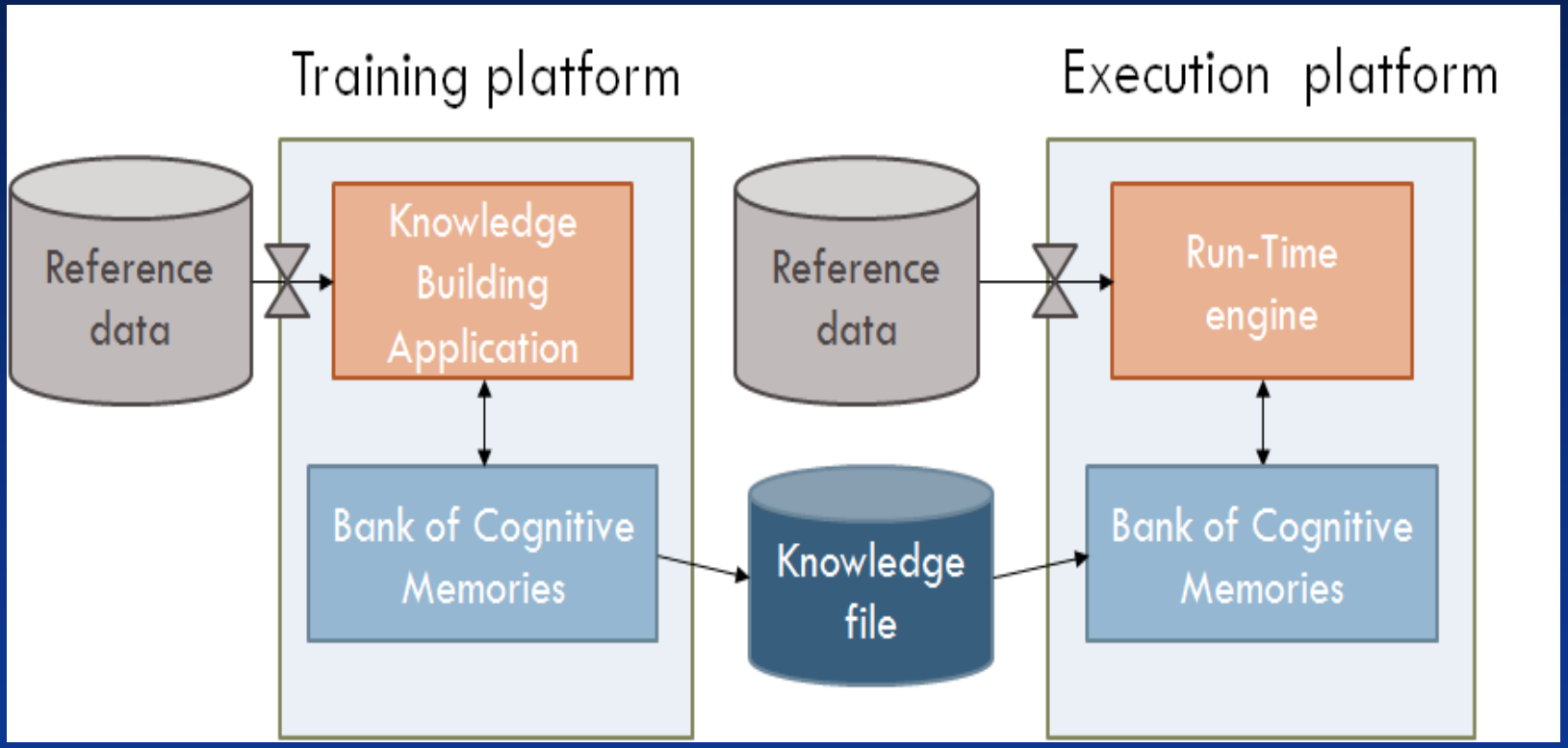
3. Multi Application-specific
   - Various knowledge bases

4. Fuzzy Logic matching

5. Learning capability

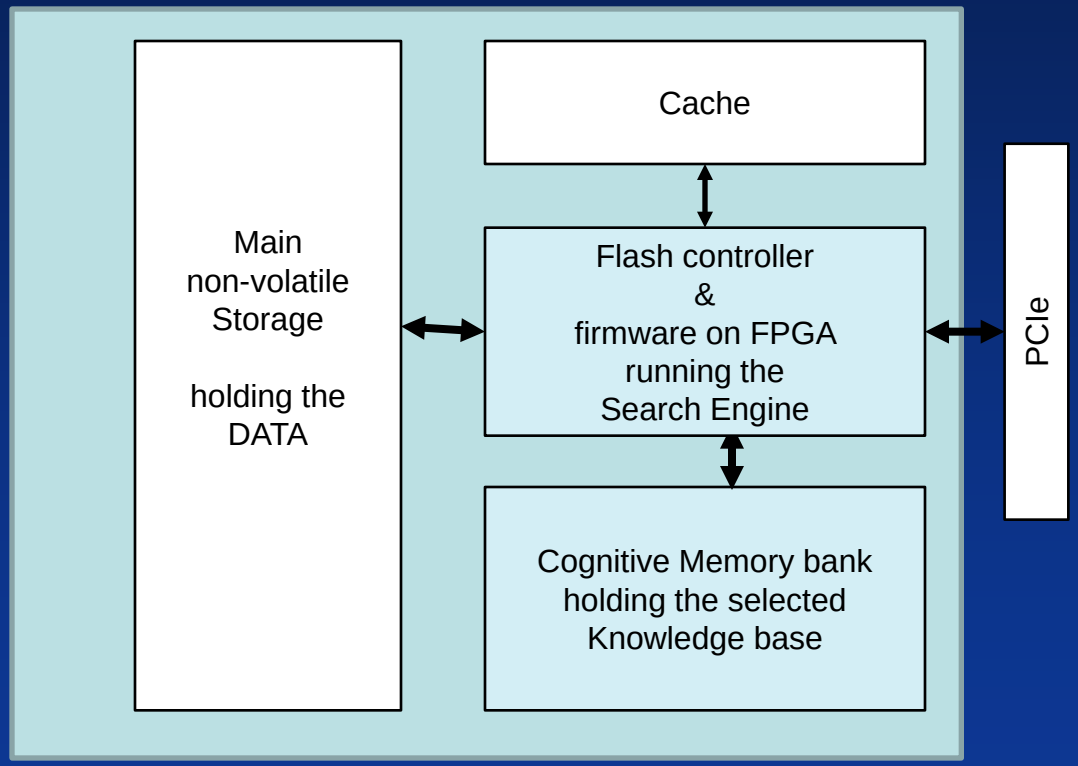
6. Train vs Program

Programming: Training vs S/W



Collaboration with Host Server

Smart SSD



Functional Interplay

- Host interface protocols
  - Driver protocol (NVME)
  - DB query overlay cmds
- Cognitive H/W
  - Driver protocol (NVME)
  - DB query overlay cmds
- Controller+
  - Intercept DB cmds
  - Utilizes cognitive memory
  - Search Engine function

The Enabling Technology Today's IC

- NeuroMem chip
  - Introduced in 2011
  - 1K cells/chip
  - 256B vector/cell
  - 10 µsec response
  - <0.5W/chip
  - 27 Mhz clock
  - 130 nm

Sample Application
Text Analytics

- CRM: Sentiment Analysis
  - Text matching
    - Library of phrases
    - 15M postings to search
  - Benchmark results:
    - 8X chips ➔ 5K transactions/s
      - vs 36 blade servers
    - Consumes 1000X less power
    - Costs much much less

Conclusion

- Big Data = Big Opportunity
- Stretches conventional storage
- With Smart SSD approach:
  - Huge leap forward
  - With incremental technology steps

Thank You Kindly For Your Attention

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