Flipkart Infrastructure Journey

Flipkart’s Infrastructure Evolution with Business Change and Growth
What’s this talk about?

- Flipkart’s Business Journey
- Flipkart Infrastructure
- Flipkart Network
- Flipkart Storage
- Flipkart’s Interest in OCP
- Flipkart OCP adoption challenges
India has the fastest expanding internet user base

**Total Population (Mn)**
- USA: 323
- INDIA: 1364
- CHINA: 1405

**Population With Internet Access (Mn)**
- USA: 286
- INDIA: 664
- CHINA: 828

*SOURCE: Euromonitor, IAMAI, China Internet Network Info, HBR, PEW | NOTE: Of 360 Mn, 220 Mn are Urban and rest Rural Consume. Collaborate. Contribute.*

2016 vs 2021 projections
India is tracking to be World’s 2nd largest Internet user base.
The Flipkart Footprint

- 100+ million products
- 120+ product categories
- 2PB data processed every day
- 120 thousand sellers
- 150+ million registered users
- In-a-day 65 cities
- 65 in-a-day sellers
- 33000 people strong
- Same-day delivery 13 cities

Flipkart Acquisitions

- WeRead (2010)
- mime360 (2011)
- Letsbuy.com (2012)
- Jeeves (2014)
- Flipkart (2015)
- Jabong (2016)
- eBay.in (2017)
Flipkart’s Shifting Workloads

- Initial e-commerce and e-books
  - Almost a traditional RDBMS application
  - Content delivery
- Flyte music store
  - Streaming content
  - Low latency
Flipkart’s Shifting Workloads

- Retail Heavy
  - Select products and listings, few retailers
  - Data and batch analytics
- Marketplace and user growth
  - Exponential growth in sellers, products and listings
  - Heavier data and batch analytics, archival data
Flipkart’s Shifting Workloads

- Tier-2 cities and many Indias
  - User generated content
  - Low latency personalization
  - Application (not just content) delivery from the edge
- Risk mitigation
  - Business continuity and disaster recovery
  - Content moderation
Flipkart’s Infrastructure

- Co-Managed Datacenters
- Multiple geographically separated regions
- x 10k baremetals / region
Flipkart’s Network

- Large Scale Deployments every 3 years
  - Overlaps with merchant silicon refresh
    - 40G 2015
    - 100G 2018
    - 200G ----
    - 400G 2022
- Disaggregate hardware & software
- Standardization of “Clos L3 Fabric”
Flipkart’s Network

- Clos Fabric
  - Merchant silicon
  - Wide ecmp spray
  - Small blast radius
  - “Infrastructure as cattle”
  - Automation
Flipkart’s Network

- Extensibility and Automation
  - Provisioning
  - Lifecycle management
  - Fault detection
  - Self healing
Flipkart’s Network Services

- Egress peer engineering
- Elastic load balancing
- SR-IOV
- Overlay
- NVMeOF
Flipkart’s Storage Evolution

- **Past:** Converged - Direct Attached
- **Present:** Composable - JBOD/Fs
- **Future:** Hyper-Composable - NVMe-oF
Why composability matters?

- Need to improve utilization of all resources
- Data has to be available unless the media itself has failed
  - Hardware failures
  - Software failures
  - Software/Firmware upgrades
  - Hardware/Network maintenances
- Storage is sticky
Why composability matters?

- Storage is unavailable when server is down for maintenance
  - Recreate the VM and rebalance/restore data from replica/backup - slow and becomes worse with larger/more disks
  - A DC wide maintenance will rewrite the data twice
  - Or wait until the maintenance is completed - risky
Storage Design

Logical View

1 JBOD
4-6 servers
2 TORs
Storage POD
4 Racks
2 TORs
8 JBOD/Fs
48 Servers
Flipkart’s interest in OCP

- Disaggregation of Hardware & Software
- Standardised API’s across classed of hardware
- Open firmware
- Community driven approach
- Drive change, than wait for vendors to incorporate
- Extensibility & manageability
Flipkart’s interest in OCP

- Rich vendor ecosystem and options
- Tested by “Hyperscalers”, could fulfil a large portion of Flipkart’s feature requirements
- Open Rack: Driving space, power and cooling efficiencies
- Large scope to experiment, internal customers
Flipkart OCP adoption challenges

- Rate of physical infrastructure growth
- New vendor ecosystem, needs solve for:
  - Availability
  - Logistics
- Software feature parity
- Support
- Need to create engineering bandwidth
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THANK YOU