



CLOUD COMPUTING CONCEPTS

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INTRODUCTION TO CLOUDS

Lecture F

ECONOMICS OF CLOUDS

TWO CATEGORIES OF CLOUDS

- Can be either a (i) public cloud, or (ii) private cloud
- Private clouds are accessible only to company employees
- Public clouds provide service to any paying customer
- You' re starting a new service/company: should you use a public cloud or purchase your own private cloud?

SINGLE SITE CLOUD: TO OUTSOURCE OR OWN?

- Medium-sized organization: wishes to run a service for M months
 - Service requires 128 servers (1024 cores) and 524 TB
 - Same as UIUC CCT cloud site
- **Outsource** (e.g., via AWS): monthly cost
 - S3 costs: \$0.12 per GB month. EC2 costs: \$0.10 per CPU hour (costs from 2009)
 - Storage = \$ 0.12 X 524 X 1000 ~ \$62 K
 - Total = Storage + CPUs = \$62 K + \$0.10 X 1024 X 24 X 30 ~ \$136 K
- **Own**: monthly cost
 - Storage ~ \$349 K / M
 - Total ~ \$ 1555 K / M + 7.5 K (includes 1 sysadmin / 100 nodes)
 - using 0.45:0.4:0.15 split for hardware:power:network and 3 year lifetime of hardware



SINGLE SITE CLOUD: TO OUTSOURCE OR OWN?

- Breakeven analysis: **more preferable to own if:**

- $\$349 \text{ K} / M < \62 K (storage)
- $\$1555 \text{ K} / M + 7.5 \text{ K} < \136 K (overall)

Breakeven points

- $M > 5.55$ months (storage)
- $M > 12$ months (overall)

- As a result

- **Startups use clouds a lot**
- **Cloud providers benefit monetarily most from storage**



SUMMARY

- Clouds build on many previous generations of distributed systems
- Especially the timesharing and data processing industry of the 1960–70s.
- Need to identify unique aspects of a problem to classify it as a new cloud computing problem
 - Scale, On-demand access, data-intensive, new programming
- Otherwise, the solutions to your problem may already exist!

