Caching for content and application delivery

Christopher Wentz
Caching for content and application delivery

Agenda

– What is caching?

– How does this technology align with the 2020 Strategic Plan?

– Proposal development.

– Return On Investment (ROI) & Return On Experience (ROE).
  • Needs, cost, and upkeep.
Caching

• Who wants to read the Jambar?
  – Time to stretch your legs.

• Key terms
  – Bandwidth – How “wide” is the pipe.
  – Data speed – How fast can you move on the pipe.
  – Bottleneck – Congested area or “merge point”.
  – Commercial Internet data – Not sensitive or personal data.
Caching Server

• One for many
  – Captures one copy and retains it for others.
  – You wouldn’t walk to the copier for each memo for each employee. Why are we doing that with web content?
How much data?

- Caching is only beneficial if we can use it
  - Low hanging fruit (30 days)

- YouTube 22,000 Gig (Anticipated 14,000 Gig proposed savings).
- Facebook 8,000 Gig (Anticipated 4,000 Gig proposed savings).
- Netflix 10,000 Gig (Anticipated 7,500 Gig proposed savings).
- Apple App store 2,500 Gig (with ~60-70% locally delivered POC).

- 1 Gig = 15 hours of Spotify -
Caching and the 2020 Plan

- Accountability and Sustainability (ROI)
  - Anticipated decrease in needed bandwidth purchase.
  - Effective and efficient use of purchased bandwidth.
  - Internet speed cost.
Caching and the 2020 Plan

• Student Success - Return on Experience (ROE)
  – Students are able to take advantage of internal technology upgrades.
  – Student network experience is delivered at internally available speeds.
    • Locally served content.
  – Removal of dorm (~1,000 devices) users resulted in near zero experience improvement.
    • When a void was created, it was just filled.
Proposal Development

• The data that drives a network and the proof of concept.

• Terms
  – Gigabyte/Gigabit
    • Remember for comparison 1 Gigabyte is about the same as streaming Spotify for 15 hours. (How much)
    • Our current external Internet connection is 1 Gigabit Gbps. (How fast)
    • The more Gigabytes moved, the slower an individual user’s Gigabits experience will be.
Proposal Development

• User experience
  – We have all had experience with limited bandwidth.

• User feedback
  – Athletics video as an example.

• YSU mobile app
Proposal Development

• Internal measured sources

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<th>DATE / TIME</th>
<th>PING ms</th>
<th>DOWNLOAD Mbps</th>
<th>UPLOAD Mbps</th>
<th>DISTANCE mi</th>
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Asynchronous 1,000 Mbps = 1Gbps

5 Mbps-12Mbps with bursts
Proof of Concept

Apple Content Caching Server Efficiency

- Apple Content Caching Server Statistics Bandwidth Saved (GB)
- Apple Content Caching Server Statistics Data Pulled From Apple (GB)
Proof of Concept
Blending to find what fits

• Bumper-to-bumper Ferrari’s.
  – You have the ability to go fast, but can’t.

• Wide open road and then single lane construction.
  – You experience a bottleneck.

• How do we balance speed, efficiency, and longevity?
Quote and cost

- Additional Optical transceiver.
- Miscellaneous networking equipment.

- Year 3 maintenance is 17% of $29,700 OR $5,049 per year.

- Total ask not to exceed original $40,000. We expect to be fully deployed under that cost.

### Quote Details

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**Special Terms**

- Offer to YSU;
- Capped spending for 2 years regardless of offload (maintenance included)
- Starting in year 3 maintenance is 17% of purchase price
Return on Investment

- OARnet price and cost avoidance.
  - July pricing information
    - 1 Gbps connection price = $2,600 (per month)
    - Proposed purchase 4Gbps = $7,600 (per month)
    - Capability to connect at 10Gbps = $16,500 (per month)
  
  - Anticipated cost avoidance (2Gbps) $5,200 (per month)

- Increasing Internet speed does not necessarily increase the ability of the user to move data.
Return on Investment

- Anticipated cost avoidance – We do not purchase an additional 2 Gbps – $5,200 per month Or $62,400 annually.

<table>
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<td>Cost Avoidance</td>
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Results Summary

- Total project cost savings/income: $374,400
- Total project expenditures: $-51,446
- Net project savings / income: $322,954
- ROI (return on investment - after 5 years): 627.8%
- Payback year: Year 1
Return on Experience

• ROI helps in cost justification
  – A good ROI may not be a good experience – Cost cutting.

• ROE
  – Can be difficult to place a hard cost to.
  – Positive ROE results in:
    • Satisfaction
    • Efficiency
    • Better delivery of content
    • Better retention of material

• When providing a service a balance should be found.
Return on Experience

Internet 1 Gbps

Local speed 5-10 Mbps

Proposed

1 Gbps

Internet

Local speed as fast as the Internal network 100-1,000 Mbps to cache.
Who receives benefits

• Students
• Faculty
• Staff
• Visitors both on and off campus
• Contractors and Auxiliary units
• Perspective students and employees
Questions
and proud.