UCSC Rollout of Opencast Matterhorn for Lecture Capture

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Michael Nardell
nardell@ucsc.edu

Welcome

This is an auspicious time for this presentation - we have reached our Phase 1 Goals for this project:

- 30 classrooms are equipped for Opencast Matterhorn recording
- We record about 60 courses per quarter
- ... and have recorded over 4000 lectures since fall 2015

Presentation Recording

http://matterhorn2-util.lt.ucsc.edu/search/?seriestitle=UCCSC-DEMO

What is Lecture Capture?

Lecture capture is a technology that digitally records course lectures

Makes the lectures available online for students to be viewed when and where the want.

What is Opencast Matterhorn?

Opencast Matterhorn is an open-source (and open-ended) lecture capture system.

http://www.opencast.org/matterhorn

Open source is never free - particularly true of lecture capture where the hardware costs are substantial.

Why Lecture Capture?

- Many answers to this question...
- Helps reinforce the student's learning experience
- An important tool used to assist the students with disabilities
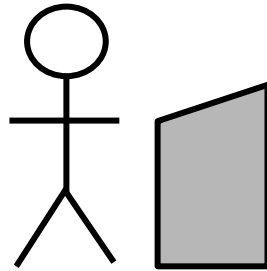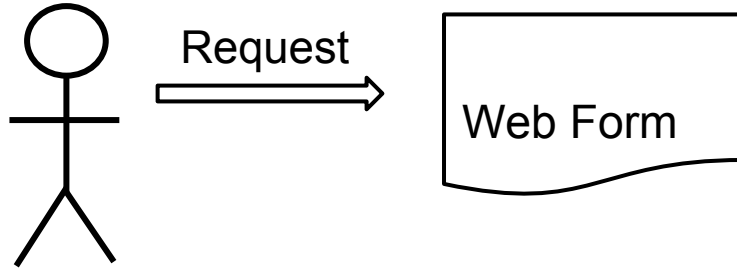

Lecture Capture overview from UNH

http://unh.edu/lecturecapture/understanding_lecture_capture.html

7 Things about Lecture Capture:

http://net.educause.edu/ir/library/pdf/ELI7044.pdf

What is the User Experience?

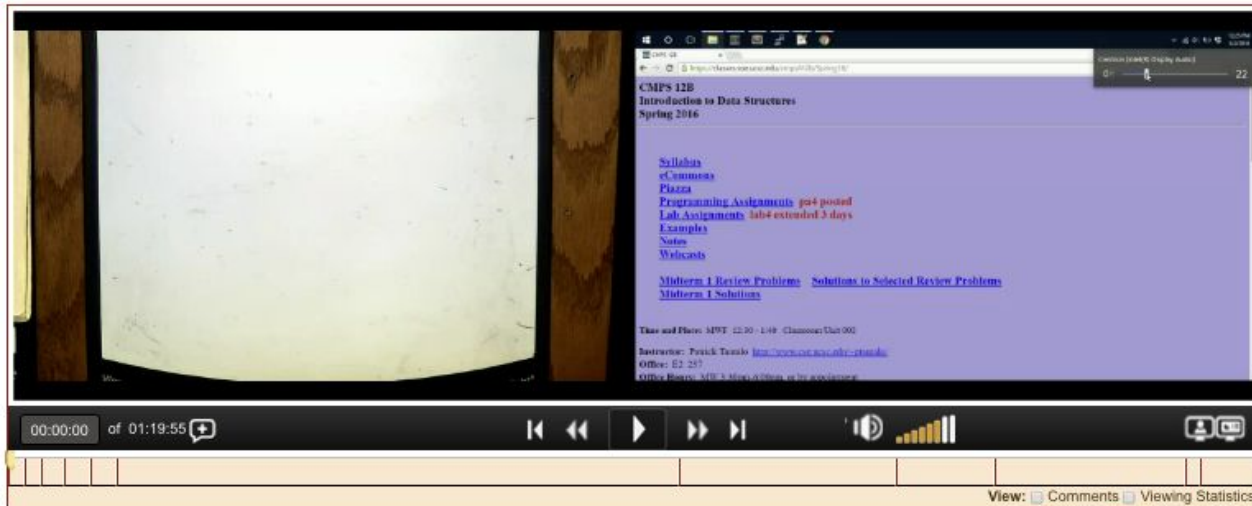Simple for Instructors:

Request

Web Form

Lecture, as you normally would. Audio and video is recorded.

User Experience for Students

Students go to a site which lists available course lectures:
webcasts.ucsc.edu

Students can then view lectures with the Matterhorn Player:

Where We Started (2012)

- There was a recognized need to replace a home-grown system
- Matterhorn was making its debut, and was clearly something we should consider
- Our requirements would prove challenging for the state of Matterhorn in 2012
- Phillip Stark pulled together a small team:
  - Sheryl Martin-Schultz
  - Mikey Orr
  - Michael Nardell
  - Matt Norwood
- Close working relationship with Media Systems Engineering team:
  - Jeff Wagner
  - Dan Mohr
  - Lea Scarpell
  - Michael Veglia
  - Thomas Beckner

What We Did

Lots of planning: you need high powered servers for processing and streaming, quality capture equipment installed in classrooms and lots of storage). These unavoidable costs mandated that we get it right early, to avoid painful mistakes.

Defined a phase-one plan: standardized, scalable, low maintenance and low operational overhead service. Low marginal cost to expand to new classrooms. Just runs (automated, reliable). Initial rollout to meet 80% of needs, then move toward fulfilling remaining needs.

What We Did

**Survey of available alternatives.** All were commercial and expensive.

First rule of lecture capture - your have one chance to get it right at the point of recording: We focused on getting a solid, inexpensive classroom recording device (aka Capture Agent)

Lots of testing of lecture recording devices. At the time of testing there were few (if any) commercial capture agents that met our requirements.

We settled on building our own capture agents, similar to UC Berkeley's

For a recent survey of recording devices (many compatible with Matterhorn) see:
Evaluation of Lecture Capture Appliances. Oregon State University

The Architecture of Matterhorn
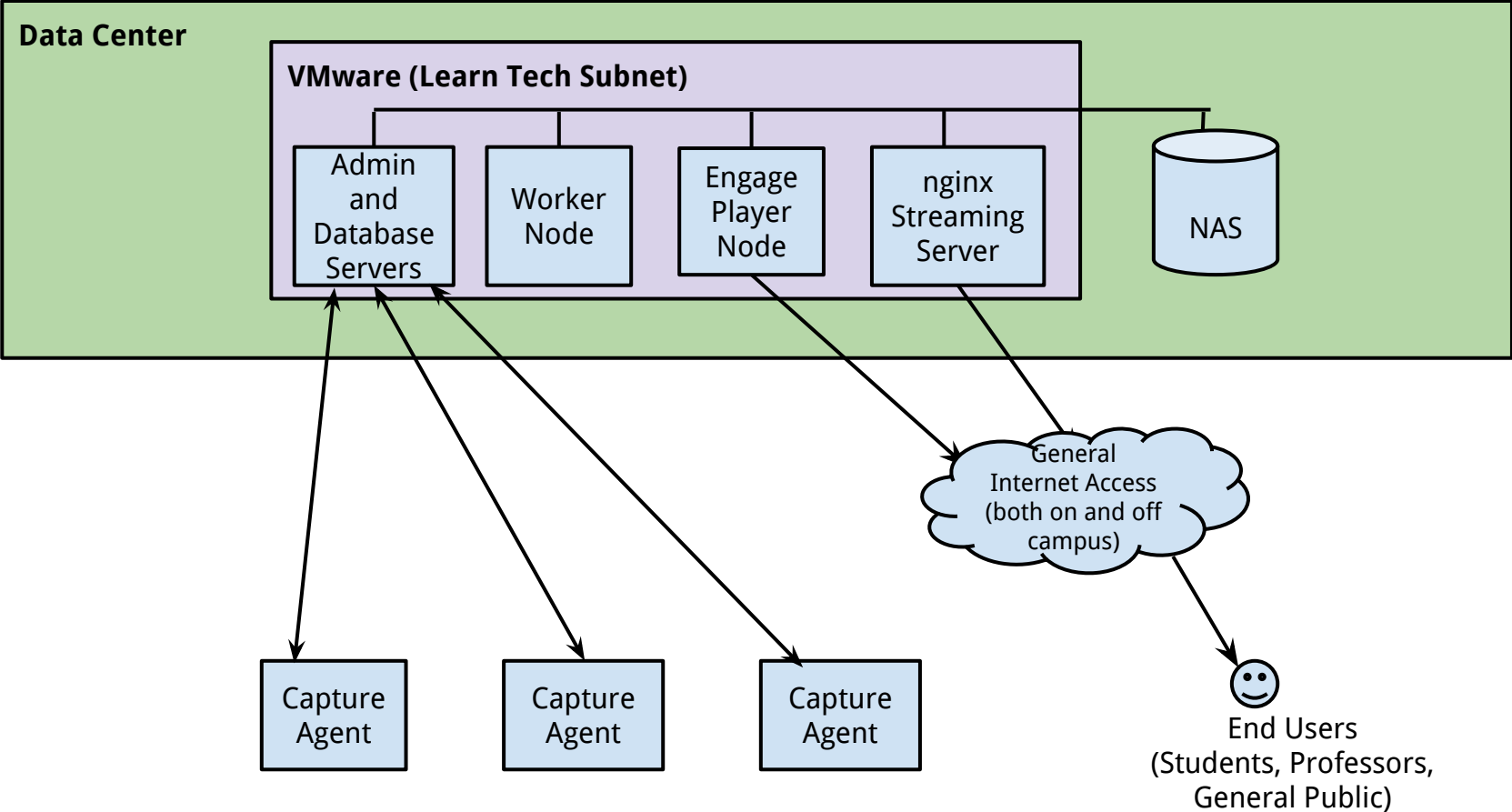
Server Environment

Our matterhorn cluster is scattered across 12 VMWare hosts and 2 physical storage nodes.

The VM hosts can be broken down into groups:
- Core/Admin: matterhorn2-core-1, matterhorn2-db-1, and matterhorn-util
- Player: matterhorn2-player-1 and matterhorn2-streamer-1
- Worker: matterhorn2-worker-01 through matterhorn2-worker-06
- Frontend: webcast

Capture Agent Specifics

Software: Matterhorn Reference CA 1.5.1 running under Ubuntu 12.04.5

CF Engine and custom scripts for configuration management

Single Input Capture Agent

- Dell Optiplex 9020, SFF, 3.3 GHz i5 Processor
- Datapath AV/B single HD input card

Dual Input Capture Agent

- Dell Optiplex 9020, MT 3.3 GHz i5 Processor
- Datapath AV-HD dual HD input card

Audio is recorded with the built-in analog audio ⅛" stereo input.

We are in the process of converting to Galicaster as Capture Agent Software:

For more information on UCSC's choice of capture agents, see presentation on this topic

Deployment

Big bang vs. Incremental: We had wanted to do a complete replacement of the old system in one fell swoop. In the end we settled on selecting about 5 classrooms that offered a good opportunity to test different conditions

Started with Matterhorn 1.5

Since Fall 2015 Phase 1 Goals met: Matterhorn's flexibility and openness made it possible to make some incremental changes:

Upgraded to Opencast Matterhorn 2.0

Monitoring across entire system with Xymon

What's Next

- Deploy lecture capture equipment in 20 more classrooms.
- Better captioning
- Automate more
- Faculty uploads
- Question of archival long term storage.
- Mobile.
- In room confidence monitoring