Building Your Virtual CS Department

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What is a Virtual CS Department?
My definition for purposes of this talk

- 3D, video game-like
- Multi-user, collaborative environment
- Persistent “virtual world”
- Based on a real academic space
- Where students can learn to do CS stuff
Why Build a Virtual CS Department?

- CVE’s are the killer app of the decade
- Better remote support than e-mail or IM
- Augment regular teaching methods/tools
- Offload certain tutorial tasks
- Be the hippest CS program in your peer group (or connect with your peer group!)
- A game-like environment may aid colossally for recruitment and retention
But Why a Virtual CS Department?

**Cons**
- Real space unnecessarily constrains virtual space
- CS is not as exciting as pretending you are an elf?!
- Virtual space capable of reflecting intellectual domains of study better than real spaces

**Pros**
- Familiarizes future students
- Already familiar to locals / faculty
- Allows augmentation of real and virtual spaces
- Real and imaginary spaces are not mutually exclusive
  - Build real places, connect them with abstract space

Challenges

**Given $0, how do I...**
- Create a 3D world that is cool enough
  - “make or buy”? “make” sounds hard
  - Collect lots of textures
  - Build a detailed 3d model of my world
- With enough stuff to do to be interesting
  - Stuff that is CS education-relevant
  - Implies CS domain-specific tools
  - What you can “buy” won’t have these
Textures

- 2D image, to be drawn on a 3D surface
- Harder than I thought it would be
- Start with digital photos of everything…
  - each room needs 3-300 photos
- Tedious manual editing process!
  - crop dimensions to power of 2
  - remove irregularities
  - scale them down to fit more in
  - most textures need to be tileable
  - may need GIMP or Photoshop

Texture Example
3D Model

- If CAD/blueprint data is available, use it... if you can read/understand/convert it
- Otherwise, start from floor plans
  - Give (x,z) coordinates; add your y’s
- Decide on a coordinate system
  - Where is 0,0,0? Feet or meters?

Modview
Second Life

- www.secondlife.com
- Focus: user-created virtual world content
- Basic use is free; you get an avatar
- Land ownership requires a pay account PLUS monthly rent (e.g. $57 + $18/month)
- Linden released second life source code!
  - But main point of SL is to be in their world?
- (Launch second life demo here)
Creating Virtual Stuff in Second Life

- Own land, or find a sandbox
- Land strictly limited in the number of primitives it can support
- Primitives strictly limited in size
- Server-oriented, hard to do stuff locally and then “publish it”
- Pay $$ to upload textures, media

Scripting in Second Life

- LindenScript is event-driven, state-based
- Server based, local development awkward
- Scripts are associated with objects
- Typical events are user clicks, but there are many event types.
- Limited to 8K per script, multiple scripts/object
- Runs real slow on a timeshared server machine
- http://secondlife.com/developers/resources.php
"Issues" in Second Life

- It’s mostly empty; see the WIRED article
  - Frank Rose, “How Madison Avenue is Wasting Millions on a Deserted Second Life”
- It lacks reasonable protections
  - No law or cops
  - Inadequate property controls
- Too “adult”; feels like a bad side of town
- Sufficient for social purposes, do-able for lectures, need major customization to support labs/office hours.
CS educational virtual environment
Initial funding from NSF ATE program
Lives at cve.sourceforge.net
Runs on X11 and on Windows (OpenGL)
SIMPLE 3d worlds, needs more tools
Collaborative IDE
Under construction
CS departments so far: UI and NMSU
Static and Dynamic Model Data

# static properties of a room
Room {
  name SH 167
  x 29.2
  y 0
  z 0.2
  w 6
  h 3.05
  l 3.7
  floor Rect { texture floor2.gif }
  obstacles [
    Box { # window sill
      Rect { coords [29.2,0,.22,29.2,1,.22,
                      35.2,1,.22,35.2,0,.22] }
    }
  ]
}

# static properties of a door
Door {
  x 33
  y 0
  z 3.9
  height 2.3
  plane 3
  rooms [SH 167, corridor 167]
}

# dynamic state of a door
link {
  name link1
  openness 1.0
  delta 0
  direction 1
}

Under Construction

- 3D model imports
  - better avatars, more virtual objects
- NPCs and quests
  - CS/library tutorial content
  - a recruiting tool, will reach grades 4+
- Collaborative debugger
- Collaborative design (UML--) tool
- Augmented reality and virtuality
I Need Help

- Want to build your CS department?
  - I’d love to work with you
  - or: be part of my next grant proposal

- Want to help?
  - projects for students and new friends
  - standalone tools, or core system elements