Summer of Software Engineering
Vermont Technical College
March 3, 2009

What is VTank?

- 2D multi-player, networked tank game.
  - Players run a client
  - Log into server
  - Drive tanks around a 2D game world shooting at enemies or other players.
    - In some games players work together.
    - In other games players attack each other (or work in teams against other teams).

What is SoSE?

- Summer of Software Engineering
  - Brainchild of Chris Beattie in Williston
  - Gives VTC students an opportunity to work on a realistic software project following industry standard best practices.
    - The students are even sometimes paid!
  - Active since 2006.
  - The WOW phone directory is the product of SoSE 2007/8.
  - Looking for Randolph students to participate as well!

VTank v0.0

- SoSE 2008 produced a preliminary VTank
  - Map editor
    - Allows user to build maps defining the game world
    - C++ using wxWidgets for GUI
    - Compiled with Code::Blocks (gcc) on Windows and Linux
    - Status: Functional, but rough.
  - Client
    - Program run by players
    - C++ using OpenGL for graphics (GLFW, DevIL, etc)
    - Compiled with Code::Blocks (gcc) on Windows. Linux support planned, but not fully implemented.
    - Status: Almost functional. Lacked communication channel

VTank v0.0 (cont)

- Server
  - Coordinated the users and managed the game world's dynamics.
    - Stackless Python
    - Developed using the PyDev plug-in for Eclipse
    - Used a MySQL backed
    - Status: Significant parts done (weak in the area of game world management).

GL_Window

- SoSE 2008 attempted to create a custom game engine based on OpenGL called “GL_Window.”
  - Included primitives relevant to the VTank's graphics.
  - Also a GUI toolkit using OpenGL
    - Dialog boxes
    - Text input fields
    - Scroll bars
    - etc...
  - A major undertaking!

SoSE 2008 Lessons Learned

- Use a third party game engine.
  - Too much work to implement a custom one.
  - GL_Window still a worthy project, however.
    - Moved to its own area in the CIS repository.
- Make sure tools and infrastructure are in place early.
  - SoSE 2008 spent a lot of time configuring tools.
  - SoSE 2009 is solving its tooling problems *now*.
- Insist on “best practices” from the start.
  - SoSE 2008 got sloppy and ultimately slowed down.

VTank Redesign

- Based on the experience of SoSE 2008, the VTank project is being redesigned.
  - Map editor carried forward...
    - It is the most mature SoSE 2008 product.
    - Will remain C++ using wxWidgets on Windows and Linux
    - Primary build tool switched to Visual Studio (Windows), but remains Code::Blocks/gcc on Linux.
  - Client scraped...
    - New Client will use Microsoft's XNA (v3)
    - C# on the .NET platform with Windows Forms for GUI (non-game) elements.
    - Windows only!

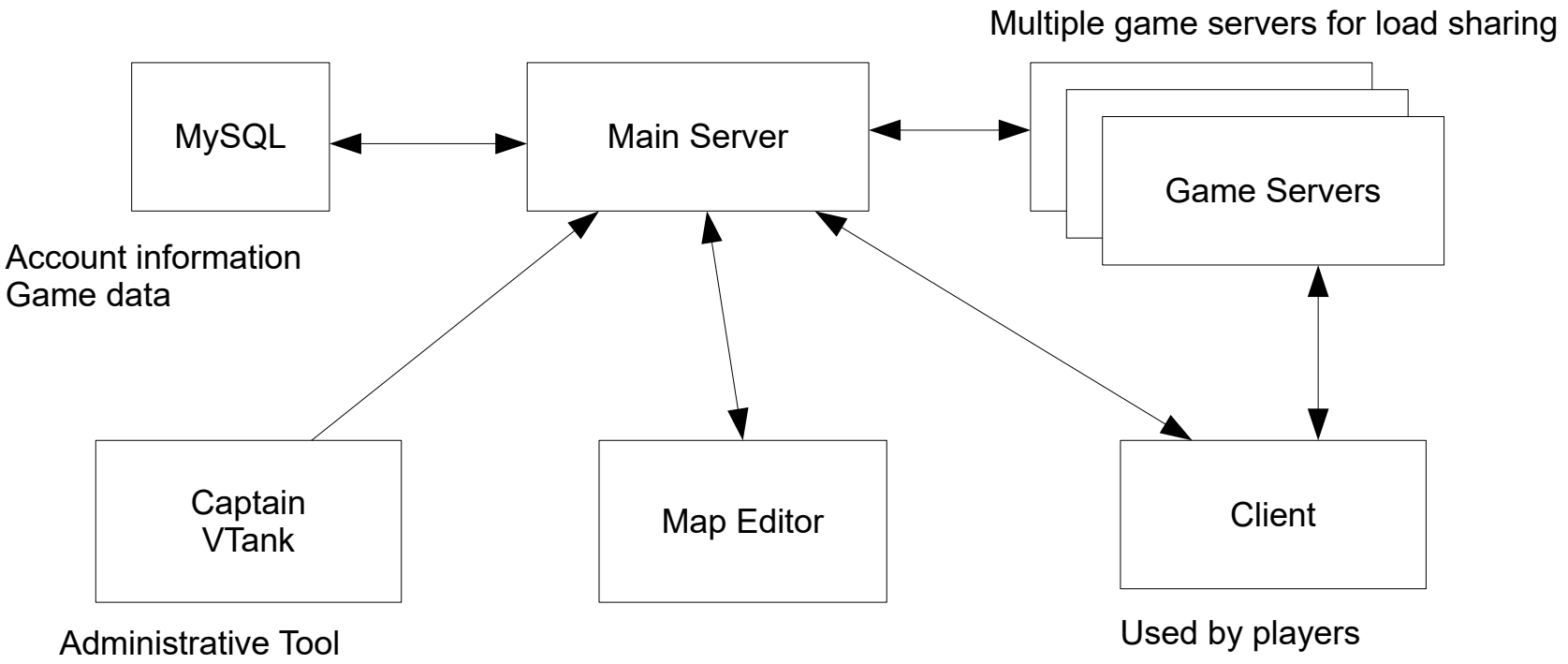
VTank Redesign (cont)

- Based on the experience of SoSE 2008...
  - Main server carried forward...
    - Mostly complete
    - Will remain Stackless Python (PyDev/Eclipse)
    - Will continue to use MySQL backend
  - Game server entirely new...
    - Switched to C++ to enhance performance.
    - Target both Linux and Windows.

VTank Redesign (cont)

- Network Communication
  - “Old” VTank used a custom built, low level protocol
  - New VTank will use Ice
    - Object oriented middleware from Zeroc
    - Abstracts away the network itself and provides many nice services “for free.”
      - Connection management.
      - Secure (SSL) connections.
      - Data encoding/decoding.
    - Fast... uses an efficient binary protocol.
      - Important considering the expected volume of traffic.
    - Supports C++, C#, and Python (and others!)

VTank Architecture



XNA

- Game development environment from Microsoft.
  - Runs on .NET; uses DirectX behind the scenes.
  - Seems fairly easy to use and well supported.
  - A big improvement over our custom GL_Window!
  - Can potentially target the XBox 360 as well.
    - But... Ice would need porting to the XBox so there are no plans to do this now.

.NET Framework

- VTank Client will use .NET
  - This is a requirement of XNA
  - Also makes it easier to use multiple languages in the client if desired/necessary.
  - High quality virtual environment offers many nice features with wide support.
  - *Potentially* cross platform to Linux via Mono
    - But... XNA isn't supported on Mono so only a Windows version of the Client is planned.

wxWidgets

- A well respected, cross platform C++ GUI toolkit.
  - Provides the usual GUI widgets support
    - But... not a game engine; unsuitable by itself for the Client graphics.
  - Supports Windows, Linux, and many other platforms (Mac, OS/2, raw X Windows, etc).
    - Offers the potential of creating a Mac version of the map editor.
  - Lots of support; actively developed.

Stackless Python

- A special version of Python using continuations instead of an internal stack.
  - Allows for a large number of “tasklets”... essentially microtasks.
  - A useful approach for game servers
    - SoSE 2008 intended to use Stackless for both main server and game server functionality.
    - SoSE 2009 will switch the game server to C++ for overall performance and use a thread pool to provide microtasking.

Graphics?

- SoSE 2008 suffered from a lack of graphic artists.
  - SoSE 2009 may suffer the same problem.
  - Graphics are drawn by programmers and they look like it!
  - Tools investigated include
    - Gimp
    - Blender
    - Photoshop
  - VTank needs a graphic artist!

Best Practices

- SoSE is intended to emphasize “best practices.”
  - Design
  - Documentation
  - Development methodology
  - Construction and libraries
  - Testing
  - Support
    - Bug tracking
    - Community support
- Let's look at how SoSE is doing these things.

Design

- UML
  - The object oriented components have UML designs
    - Alas, not always up to date.
- Ice
  - Slice specifications document the communication.
- Written documents
  - The “Docs” folder in the VTank repository contains a running commentary on VTank's design.
- Design meetings
  - Weekly “Geek Lunch” meetings.

Documentation

- Doxygen
  - C++ and Python code are documented using the Doxygen tool.
    - Extracts HTML documents from source code.
    - Encourages detailed comments.
  - C# code will use a similar tool, but maybe a .NET specific one.
    - Precise tool is unclear at this time.
- OpenOffice
  - Used for all written documentation, presentations.
  - Main VTank document is dozens of pages long.

Development Methodology

- Iterative approach
  - Each iteration of the project has well defined deliverables (milestones).
  - Small enough to complete in a couple of weeks.
- “Tracer Bullet” development.
  - Build enough of the system to demonstrate early.
  - Spend most of the time fleshing out the skeleton.
    - SoSE 2008 did not follow this approach
    - SoSE 2009 may follow it more closely
- “Basecamp” based developer communication

Construction and Libraries

- IDE support
  - Visual Studio (C#, C++/Windows), Code::Blocks (C++/Linux), Eclipse.
- Source code management
  - Subversion
- Third party libraries
  - XNA
  - wxWidgets
  - Boost (planned for use with C++)
  - Threadpool (planned for use with C++)

Continuous Integration

- Server builds/tests entire project with each commit.
  - CruiseControl.NET on a Windows server.
    - Detects each commit.
    - Updates it's working copy.
    - Uses MSBUILD to build the Visual Studio solutions.
    - Executes unit tests.
    - Reports results on a web page or to a client.
  - This helps to ensure that the project can be built at all times.

Testing

- Unit tests
  - NUnit for C#
    - Well respected unit test framework inspired by JUnit.
    - Works with CC.NET “out of the box.”
  - Custom test framework for C++
    - Simplified and tailored to SoSE's needs.
    - Outputs XML in a format acceptable to CC.NET
    - Currently under development.

Support

- Bug tracking
  - Mantis
    - Third party, full featured bug tracking system.
    - Used also for the WOW project.
- Community
  - VTank blog
  - VTank web site with forums, downloads, etc.
    - Planned to also include web based interface to user account information, etc.

SoSA?

- Summer of System Administration
  - A potential sister project to SoSE.
  - Provides administrative support to SoSE.
    - Bug tracker
    - Home pages
    - Forum administration
    - MySQL database administration
    - Security review and monitoring
- Does not currently exist

SoSE People

- Staff
  - Chris Beattie
    - Lead manager
  - Peter Chapin
    - Technical advisor
  - Mike Soulia
  - Ben Johnson
- Students
  - Andy Sibley
  - Isaac Parenteau
  - Susan Smith
  - Trevor Willis
  - Andrew Palmer
  - David Ransom
  - Nick Guertin

References

- Summer of Software Engineering
  - http://www.summerofsoftware.org/
- VTank Blog
  - http://vtank.summerofsoftware.org/
- Mantis Bug Tracker
  - https://wow.vtc.vsc.edu/bugs
- VTank Build Server
  - http://frolic.cis.vtc.edu/
- VTank Source Code
  - svn://svn.cis.vtc.edu/VTank/trunk

YouTube

- https://www.youtube.com/watch?v=UZJAIIdXKtI
- https://www.youtube.com/watch?v=7oGf5sRw1L0

Codebase

- Currently (late 2025) the VTank code base is on GitHub
  - https://github.com/pchapin/vtank