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VIRTUAL WORLD FRAMEWORK

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What is VWF?

- The Virtual World Framework (VWF) is a fast, light-weight, web-based architecture for creating and distributing, scalable, collaborative, and component-based virtual spaces.
- When an application is designed to use the VWF, the architecture automatically handles the replication and synchronization between clients, allowing the application to be shared by multiple users

Design Philosophy

- Embrace HTML5 and web-based standards
  - Execute simulations on multiple platforms
  - Ensure future compatibility
  - Enable integration with other technologies
- Embrace open source technology
  - Avoid vendor lock in
  - Leverage the community of users to develop the platform
  - Need a feature or have an improvement? Build it! Submit it!
  - Allow users to branch and modify the platform for their own needs

Design Philosophy

- Use JavaScript for simulation logic
  - There are millions of web developers in the world. It's accessible and easy to learn
  - Performance is quickly improving, and is acceptable for may use cases
  - Development time is greatly reduced relative to other languages
  - Modify simulation logic in real time, while the system runs
- Use 'replicated computation'
  - Run all logic on client machines. The architecture ensures synchronization
  - Very low server overhead. One server can run many simulations

System Overview

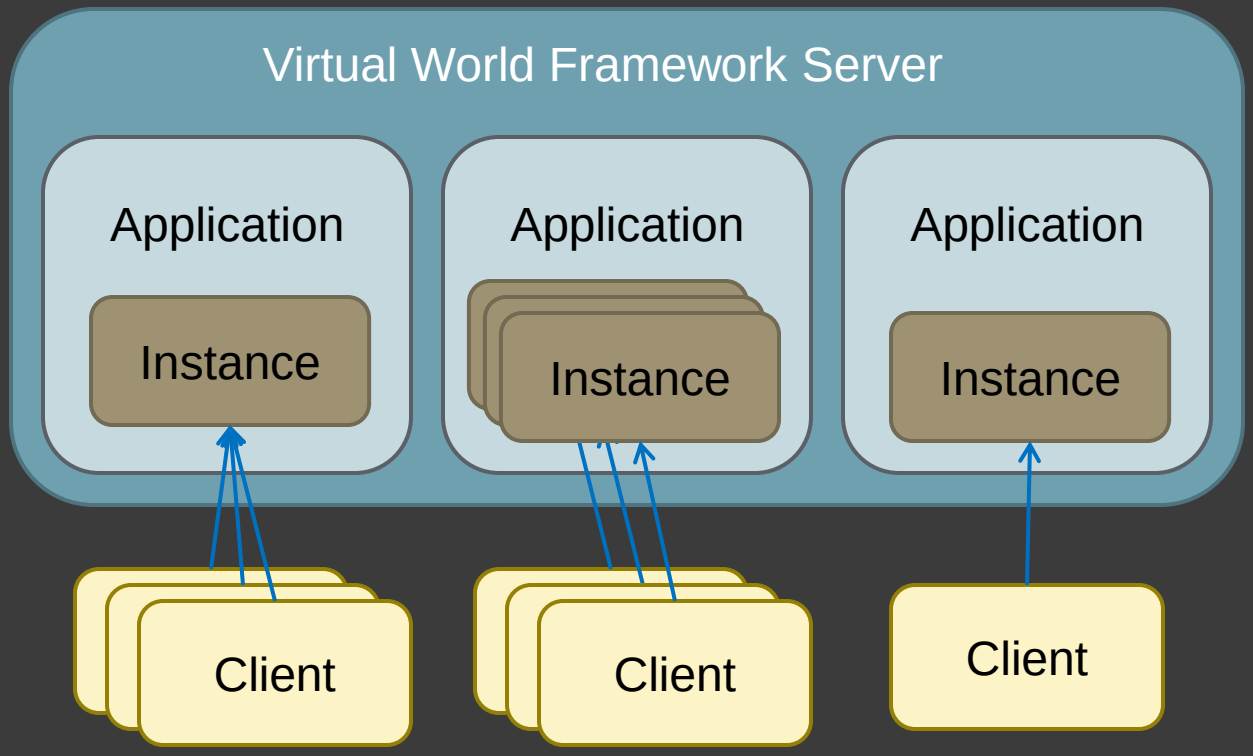
VWF Architecture and Design

- Highly modular design
  - Users can add capabilities at several levels
    - Components – reusable simulation objects
    - Drivers – Provide services and features
      - Model Drivers participate directly in the simulation, for instance the physics driver must modify the position of objects
      - View Drivers inject input and display the simulation. We currently provide drivers for the ThreeJS and GLGE rendering systems.

VWF Architecture cont.

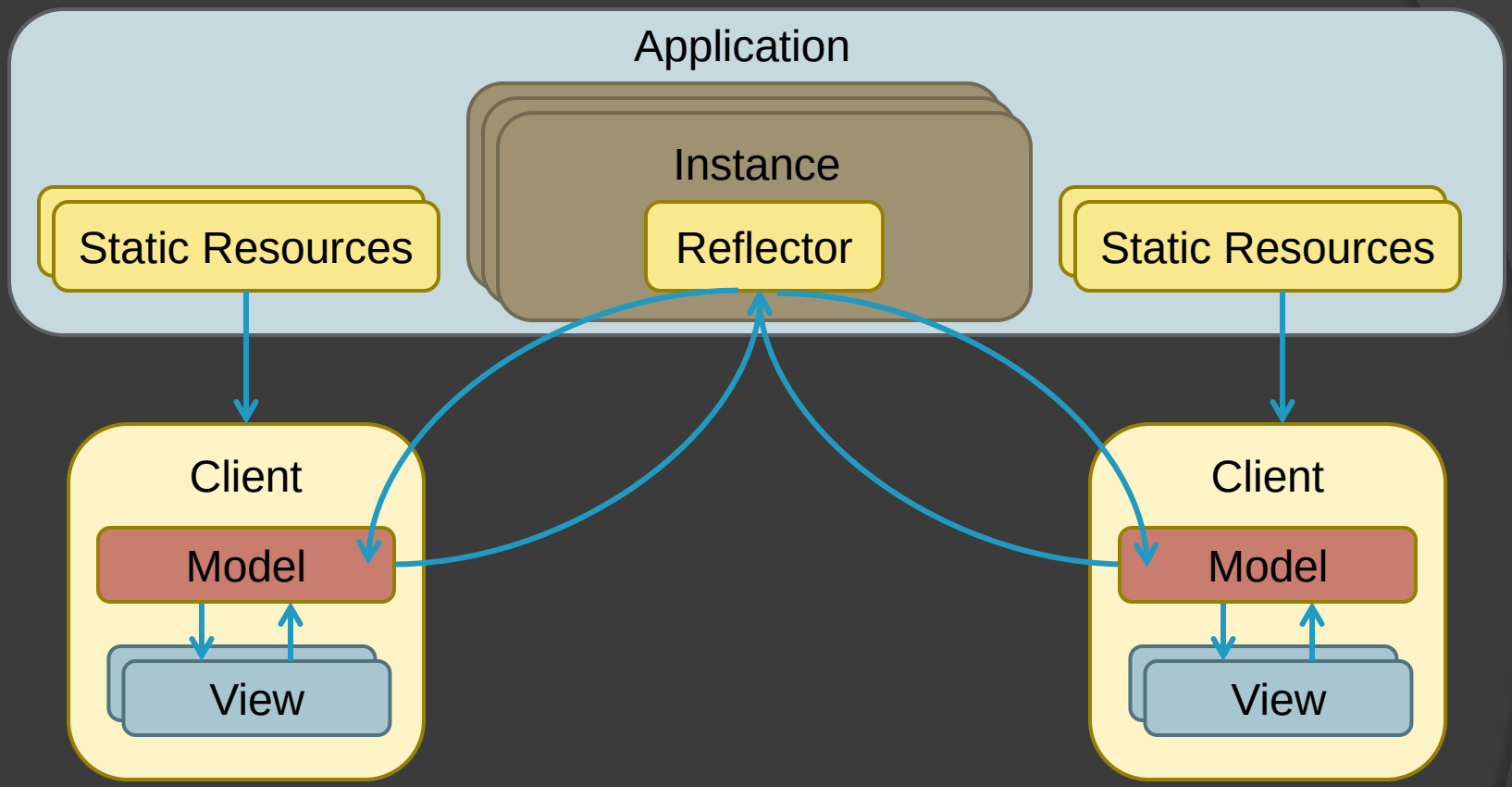
- Low bandwidth
  - Only inputs into the simulation are sent over the network
  - Logic and behavior are executed locally on each client
  - Separation of the simulation code from the view and input guarantees that clients remain in sync, even when there are no network updates
- Simple server
  - The server is simply a web host for HTML resources, and a reflector for messages
  - Server can run many applications concurrently

Server Architecture



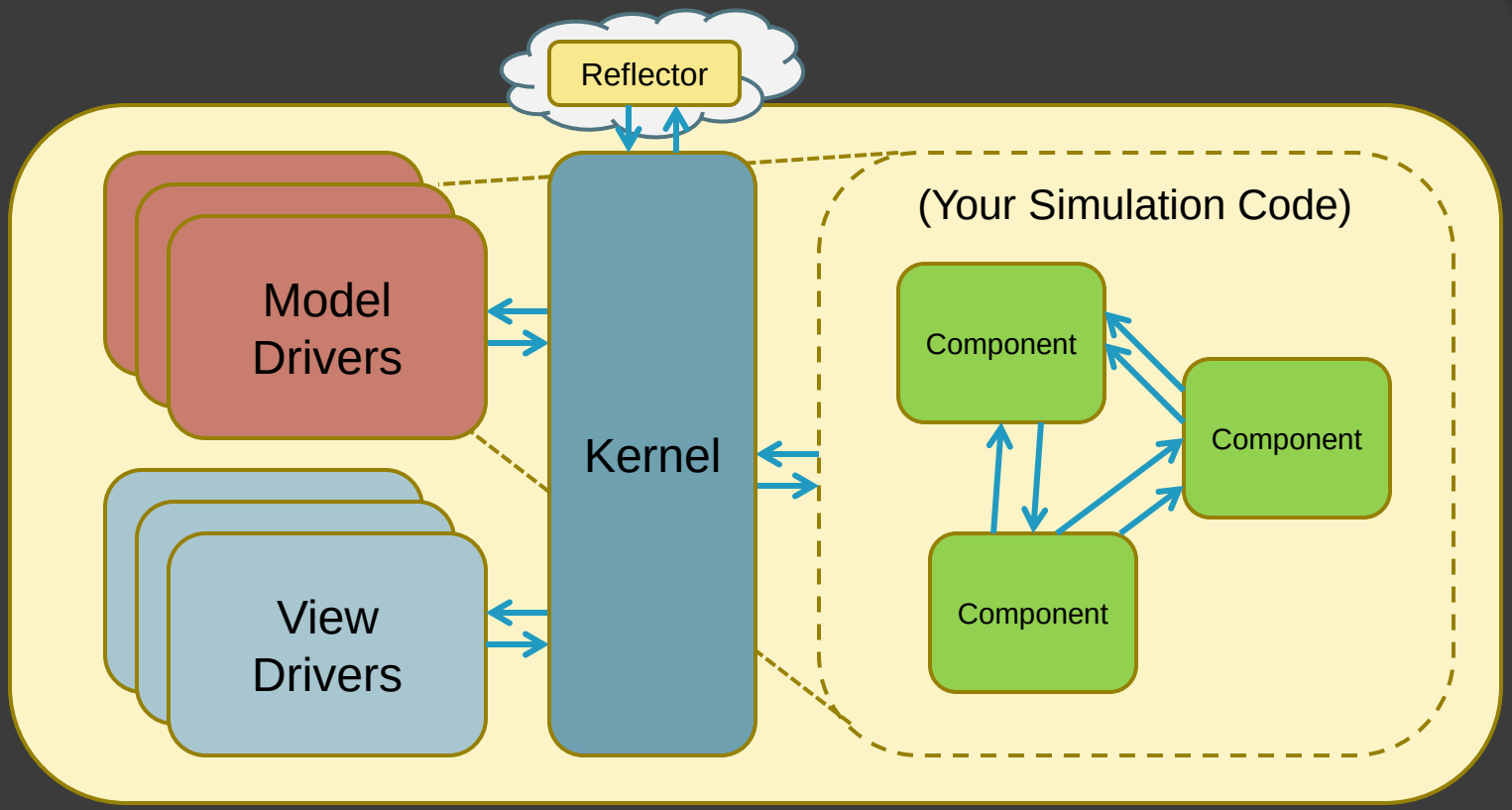
- A VWF server can host many applications
- Each application can have multiple instances running at once
- Clients connect to a specific instance of an application

Anatomy of a VWF Application



- Each client connects to a given instance of an application
- The server creates a ‘reflector’ for each instance.
- Whenever a simulation changes its internal state, the reflector synchronizes the other clients
- The view is responsible for displaying the data contained in the model

Inside a VWF Client



- The VWF system contains ‘Drivers’ that provide services to your application
- Model drivers can participate directly in the simulation by modifying objects
- View drivers can inject input into the simulation, and display the simulation data
- Technically, your simulation code is run in a special JavaScript driver
- Components are reusable simulation objects

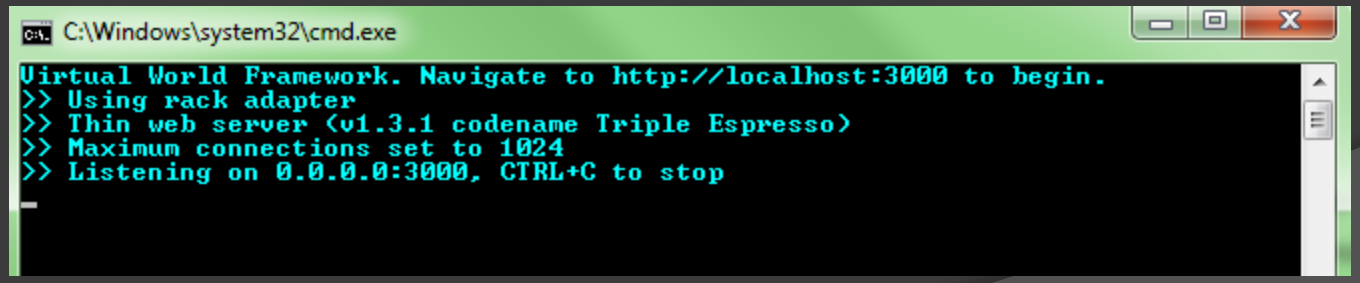
Creating an Application

Overview

- Download and setup the server
  - The server is a Ruby application
  - Instructions are available on the website
- Create a folder in the server's 'public' area
  - The name of the folder is the name of the application
- Author the simulation logic in a YAML file in the directory
  - Should be called 'index.vwf'
  - This file will be served to the client when they connect to an instance of the application
- Browse to the server URL, then to the name of your folder
  - The system will create and load a new instance of the application

Run the VWF Server

- Download the latest release:
  - virtualworldframework.com/web/downloads.html
- Extract the contents from the zip
- Double-click run.bat to start the server



Author Logic

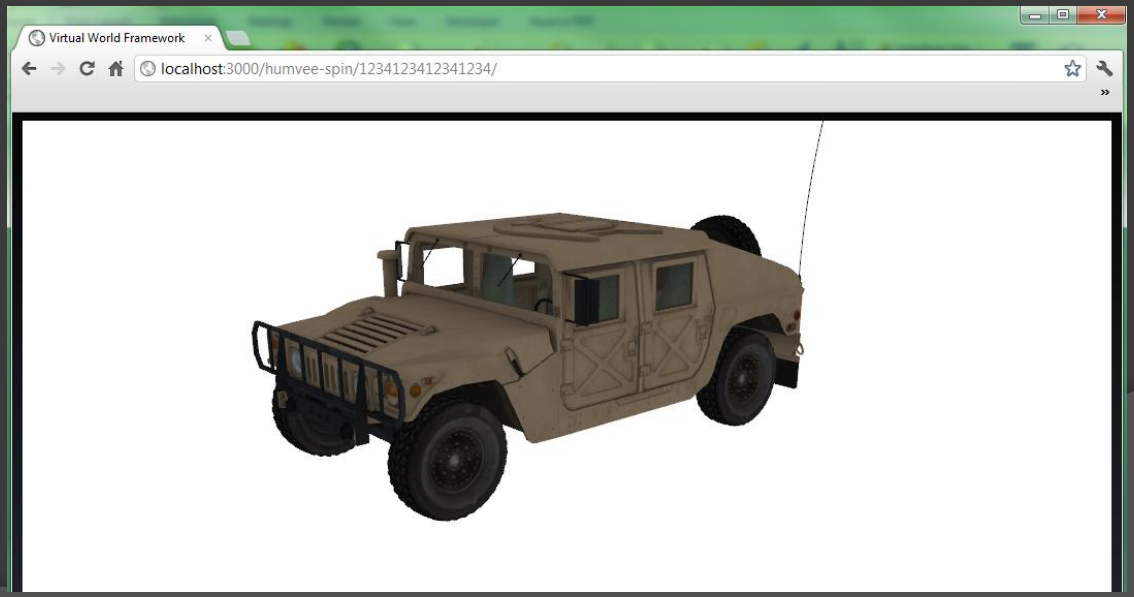
- Model file is a YAML document
- Hierarchical structure
- extends / implements keywords for reuse of components
- Can consist of:
  - properties
  - children
  - methods
  - events

index.vwf.yaml

```yaml
---
extends: http://vwf.example.com/navscene.vwf
properties:
  ambientColor: [ 183, 183, 183 ]
children:
  humvee:
    extends: http://vwf.example.com/node3.vwf
    source: humvee.dae
    type: model/vnd.collada+xml
    implements:
    - http://vwf.example.com/spin-on-click.vwf
scripts:
- |
  this.initialize = function() {
    this.camera.translation = [ -320, -360, 164 ];
    this.camera.lookAt = this.humvee.id;
    this.camera.far = 3000;
  }
```

Run the Application

- Open the application URL in the browser
  - vwf_server_IP:Port/application_folder_name
- Appends auto-generated instance ID
  - Full URL can be passed to multiple clients



Putting the Virtual World in VWF

Building an environment....

- The VWF is a framework!
- Serves as a solid foundation for multi-user web applications
  - It could be used for anything from an OpenSim like environment to a collaborative spreadsheet
- Further work required to build a virtual environment
  - Need to develop drivers to support traditional virtual world features and interactions
    - Avatars
    - Terrain
    - Weather
    - Materials and behaviors
    - Asset marketplace
    - User profiles and sign in
    - Persistence of world state

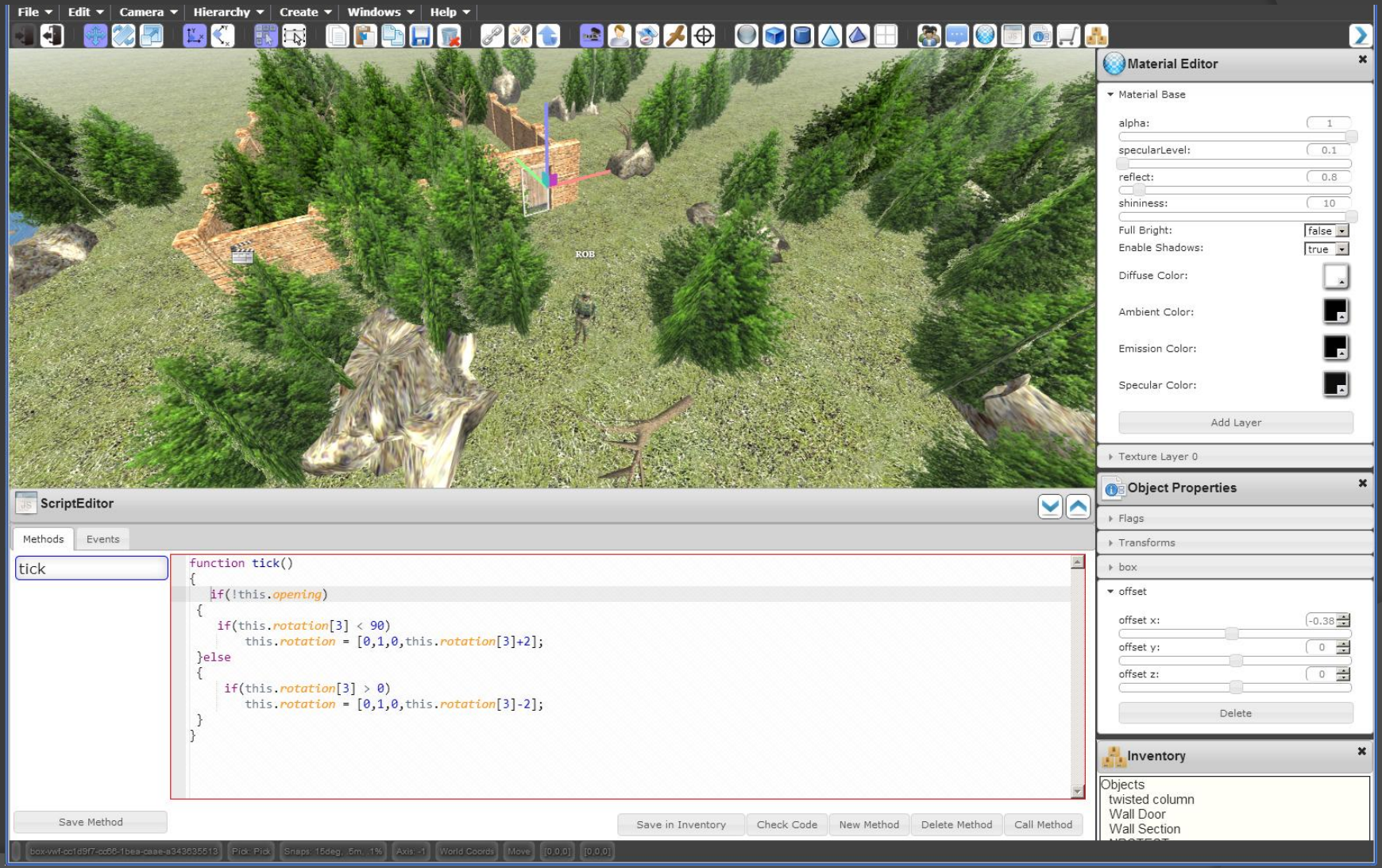
Progress

- ADL and OSD are researching many of these topics
- We're building a 'proof of concept' environment demonstrating many of these features
- Currently, it needs several security and usability enhancements before public release
- However, we're confident that the VWF serves as a solid foundation for development, and that a virtual environment can be built in the VWF

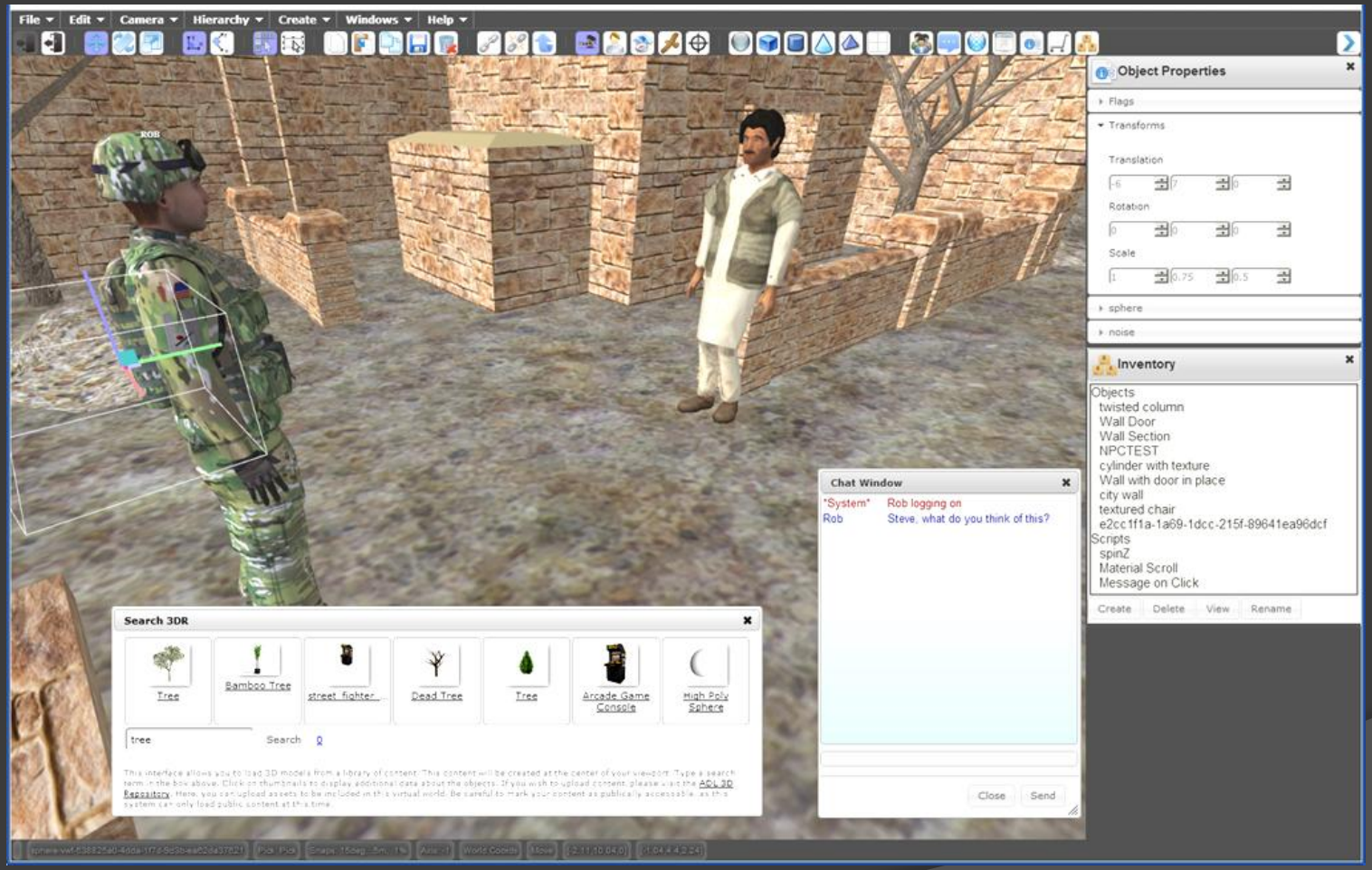
Demo Features

- Integration with the ADL 3DR for searching and loading assets
- Prototype persistence service for world state
- Basic avatar motion
- Camera modes
- Object and material editing
- Scripting
- Demo User profile and sign in service

Screenshot 1



Screenshot 2



Links

- Website and Forum: virtualworldframework.com
- To download the source: https://github.com/virtual-world-framework/vwf
- GameTech 2013
  - VWF Demo Rama! – Thursday 4/18/13
  - http://www.gametechconference.com/

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- Webinar Resource Page:
  http://www.adlnet.gov/webinars/building-a-virtual-world-framework-application-webinar