

CS 220 Spring 2008

Second Deliverable 03/31/2008: Requirements Documentation

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1. Introduction

The goal of my project is to design a virtual vending system that sells intellectual property in the Internet-based virtual world known as *Second Life*, abbreviated as SL throughout this document. This virtual vending system will allow members of SL to sell game content created in SL. It will operate in such a way that it preserves the monetary value determined by the creator on the intellectual property being sold. It will simplify the distribution of net earnings to the retailers, content creators, and administrators of the vending network, as well as give content creators more control over their products. In addition, the system itself will have a commercial value within SL.

There are 4 actors within this system. They are the Content Creators, the Retailers, the Content Consumers, and the Network Administrators. In SL, the Content Creators create products that are purchased by the Content Consumer. The Retailers serve as the middlemen. They market and sell the products of the Content Creators to the Content Consumers. The Network Administrators are responsible for maintaining this system and providing technical support to the Content Creators and Retailers.

The virtual vending system relies on Remote Procedure Calls. The two main components, the Warehouse and the Remote Vendor will primarily communicate to each other through the use of Remote Procedure Calls. A web server on the Internet is needed to serve as a bridge of communication between the Warehouse and the Remote Vendor. Both the Warehouse and the Remote Vendor reside inside the online virtual world *Second Life*. This web server will accept HTTP requests and send back HTTP responses.

2. User Requirements Definition

2.1. Functional Requirements

Outlined within this section of the document are the various functional requirements that are needed by each type of user: the Content Creators, the Retailers, and the Content Consumers.

2.1.1. Content Creator's Requirements

2.1.1.1. Warehouse Management

The Warehouse shall allow the Content Creators to their merchandise for sale into itself. The Content Creators shall also be able to remove items from the Warehouse. They shall not be able to change the names of items inside the warehouse.

Additional References: 2.2.1.1. Usability Requirements; 2.2.2.3. Maintenance Requirements

Specification: 3.2.1. New Content Added

2.1.1.2. Remote Vendor Management

The Content Creator shall be able to add and remove items that can be purchased from Remote Vendors. They shall do this at the location where the Remote Vendor is operating on the property of their affiliated Retailer.

Additional References: 2.2.1.1. Usability Requirements; 2.2.2.3. Maintenance Requirements

Specification:

2.1.2. Retailer's Requirements

2.1.2.1. Remote Vendor Presence Awareness

The Content Creator shall be notified when his/her affiliated Retailer removes the Remote Vendor from the Retailer's parcel.

Rationale: Such notifications of removal allow the Content Creator to determine how many Remote Vendors remain operational and are generating wealth for the Content Creator

Additional References: 2.2.3.1. Legislative Requirements

2.1.2.2. Payment Processing

When an item is purchased from the Remote Vendor, the payment made on behalf of the Content Consumer shall be divided between the Retailer, the Content Creator, and the Network Administrator. The Content Creator will receive the largest portion of the payment, followed by the Retailer, followed by the Network Administrator.

Rationale: The Retailer only receives commission for each sale made. The Network Administrator receives a cut for maintaining the vending system for the Content Creators, Retailers, and Content Consumers.

Specification: 3.1.5. Payment Processing

2.1.3. Content Consumer's Requirements

2.1.3.1. Merchandise Browser

The Content Consumer shall be able to browse through a list of items for sale on a Remote Vendor. The Content Consumer shall see a preview of each item one by one as a 3-D model of that item.

Specification: 3.1.1. Merchandise Browser; 3.1.2. Merchandise Hologram Projector

2.1.3.2. Point of Sale

The Content Consumer shall be able to purchase an item for sale by clicking on a Purchase Button

Specification: 3.1.4. Purchase Button

2.1.3.3. Merchandise Delivery

The Content Consumer shall receive the item he/she has purchased after the purchase price has been deducted from his/her balance. The Warehouse will send the item to the Content Consumer.

Additional References: 2.2.1.2. Efficiency Requirements; 2.2.2.1. Delivery Requirements

Specification: 3.2.3. Content Delivery

2.2. Non-Functional Requirements

2.2.1. Product Requirements

2.2.1.1. Usability Requirements

The virtual vending system shall be used mainly within the virtual online environment of Second Life. The Warehouse shall be owned and operated by Content Creators. The Remote Vendor shall be owned and operated by their affiliated Retailers. Content Consumers shall be able to purchase content created by Content Creators through the Remote Vendors of Retailers.

The Warehouse and the Remote Vendors are configured by the Content Creators. The Retailers shall have no facility to configure the Remote Vendors.

Updating the Warehouse and Remote Vendors should be simple and intuitive. The interactive environment of Second Life shall allow Drag-and-drop functionality with the Warehouse and Remote Vendors.

2.2.1.2. Efficiency Requirements

The Warehouse should deliver its contents to the Content Consumer in a prompt fashion. No more than 5 seconds should elapse before the Content Consumer receives his/her purchased item.

The efficiency of the virtual vending system shall rely heavily on the lag and latency of executing scripts inside SL. The speed of remote procedure calls such as HTTP requests and responses shall rely heavily on the amount of traffic going in and out of the web server.

2.2.1.3. Reliability Requirements

The reliability of the virtual vending system depends on the reliability of Second Life and the reliability of the web server.

2.2.2. Organizational Requirements

2.2.2.1. Delivery Requirements

The final product shall be sold to the Content Creator. It shall comprise of the Warehouse, and the Remote Vendor. The Remote Vendor shall be copyable. The Content Creator should be allowed to give away or sell their Remote Vendors to their affiliated Retailers.

Both the Content Creator and Retailer should have access to a web site that allows them to keep track of sales.

The final product shall be delivered with instructional notecards and links to online tutorials.

2.2.2.2. Implementation Requirements

The web site/web server back-end shall be implemented using ASP 3.0 written in VBscript. Its main datastore shall be created with Microsoft Access.

Warehouse and Remote Vendor shall be implemented using the Linden Scripting Language, Linden Labs own proprietary programming language for Second Life.

2.2.2.3. Maintenance Requirements

The Content Creator shall be able to update the Warehouse and Remote Vendors when new revisions are made available.

2.2.3. External Requirements

2.2.3.1. Legislative Requirements

The Warehouse and Remote Vendors shall always preserve the intellectual property of Content Creators. Retailers shall never be able to sell the Content Creators' items at wholesale prices or below their market value.

Content Creators shall always be notified if their affiliated Retailers have removed their Remote Vendors from their parcels.

3. System Requirements Specification

3.1. Remote Vendor

3.1.1. Merchandise Browser

Function	Allows Content Consumer to browse through list of items for sale
Description	The Remote Vendor has a graphical user interface that allows the Content Consumer to scroll back and forth between a sequence of pictures or “holographic projections” representing the items for sale. This interface consists of two navigator keys, a left arrow and a right arrow. The Content Consumer clicks on these arrows in order to browse. When Content Consumer begins browsing, Activate HTML Poller (3.1.3)
Inputs	Stimulus from navigator arrow keys
Source	Content Creator
Outputs	Name of item for sale
Destination	Merchandise Hologram Displayer; Activate HTML Poller
Action	When the Content Consumer browses right, the name of the next item in the list of items for sale is sent to the “Merchandise Hologram Displayer”. When the Content Consumer browses left, the name of the previous item in the list will be sent to the “Merchandise Hologram Displayer”

Reference: 3.1.2. Merchandise Hologram Displayer

The Remote Vendor shall also “Activate the HTML Poller” during this browsing session

Reference: 3.1.3. Activate HTML Poller

Requires	Items present in list of items for sale
Pre-condition	None
Post-condition	None
Side effects	None

3.1.2. Merchandise Hologram Displayer

Function	Displays item for sale to the Content Consumer
Description	The Remote Vendor displays a preview image of the item for sale to the Content Consumer.
Inputs	Name of item for sale
Source	Merchandise Browser
Outputs	3-D model of item for sale
Destination	None
Action	Generate the 3-D model
Requires	3-D models corresponding to items for sale
Pre-condition	None
Post-condition	None
Side effects	None

3.1.3. Activate HTML Poller

Function	Send message to Warehouse corresponding to Remote Vendor to check for new purchases made.
Description	Tells the Warehouse to begin polling the web server, in order to check for new purchases made during the Content Consumer's browsing session
Inputs	
Source	Merchandise Browser
Outputs	E-mail to Warehouse object
Destination	Warehouse
Action	Send E-mail to Warehouse as a notification to begin polling.
Requires	E-mail address of Warehouse object within Second Life
Pre-condition	Content Consumer is using the Merchandise Browser
Post-condition	None
Side effects	Second Life E-mail server may be down (likelihood is less than 1%)

3.1.4. Purchase Button

Function	Activates payment processing and Remote Procedure Calling
Description	Activates payment processing and Remote Procedure Calling
Inputs	Stimulus from Purchase Button
Source	Purchase Button on Remote Vendor
Outputs	Price of item, key of Content Creator
Destination	Payment Processing, Remote Procedure Calling
Action	Activates payment processing and Remote Procedure Calling
Requires	None
Pre-condition	None
Post-condition	None
Side effects	None

3.1.5. Payment Processing

Function	Deducts cost from Content Consumer's account
Description	When payment has been collected, send POST message to web server
Inputs	Price of item, key of Content Creator
Source	Remote Vendor
Outputs	
Destination	Web Server
Action	Takes money from the Content Consumer, and splits it between the Retailer, Content Creator, and Network Administrator.
Requires	Content Consumer has enough money
Pre-condition	None
Post-condition	None
Side effects	None

3.1.6. Remote Procedure Calling

Function	Sends POST message to web server.
Description	When payment has been collected, send POST message to web server
Inputs	
Source	Remote Vendor
Outputs	HTML formatted POST message
Destination	Web Server
Action	<i>Reference: 3.3.1 New Purchase Detected</i> Send a POST message to the web server. Two variables will be sent in the message. The key of the Content Creator, and the name of the item purchased. Web server will store this information temporarily in an application-level variable. The HTML Poller will be able to detect this new information.
Requires	Functioning web server
Pre-condition	None
Post-condition	None
Side effects	None

3.2. Content Warehouse

3.2.1. New Content Added

Function	Content Creator adds new item to warehouse; update database
Description	When the Content Creator adds new merchandise to his/her warehouse, the database is updated to reflect the new item for sale.
Inputs	Item for sale
Source	Content Creator
Outputs	Name of item, key of Content Creator
Destination	Database Back-End
Action	Send the name of the item and the key of the Content Creator to the database on the web server.
Requires	None
Pre-condition	None
Post-condition	None
Side effects	None

3.2.2. HTML Poller

Function	Continuously send HTML requests to the web server back-end
Description	When a Content Consumer browses through a list of merchandise at a Remote Vendor, the Warehouse will begin to continuously poll the web server every 1-5 seconds. It will continue to do so until it receives a response from the web server OR a timer expires. If it receives a response, it will activate "Purchase Processing".
Inputs	<i>Reference: 3.1.1 Merchandise Browser; 3.2.3 Purchase Processing</i> Message from Remote Vendor, HTML response from web server back-end
Source	Remote Vendor, web server back-end
Outputs	HTML request
Destination	web server back end
Action	The Warehouse will send an HTML request to a web server every 1-5 seconds. The web server handles these requests with "New Purchase Detected" function. The Warehouse will stop sending HTML requests until it has received an HTML response. 30 to 60 seconds after the Warehouse will also stop sending HTML requests.
Requires	<i>Reference: 3.3.1. New Purchase Detected</i> Functioning web server
Pre-condition	HTML Poller is inactive
Post-condition	HTML Poller is active
Side effects	None

3.2.3. Content Delivery

Function	Deliver item to Content Consumer
Description	When a Content Consumer makes a purchase, the Warehouse corresponding to the Remote Vendor shall deliver the item to the Content Consumer.
Inputs	Name of item, key of Content Consumer
Source	Warehouse
Outputs	Item from warehouse
Destination	Content Consumer
Action	Tell Second Life to deliver a copy of the named item to the Content Consumer with the matching key.
Requires	Item to be delivered must be present inside the Warehouse
Pre-condition	None
Post-condition	None
Side effects	None

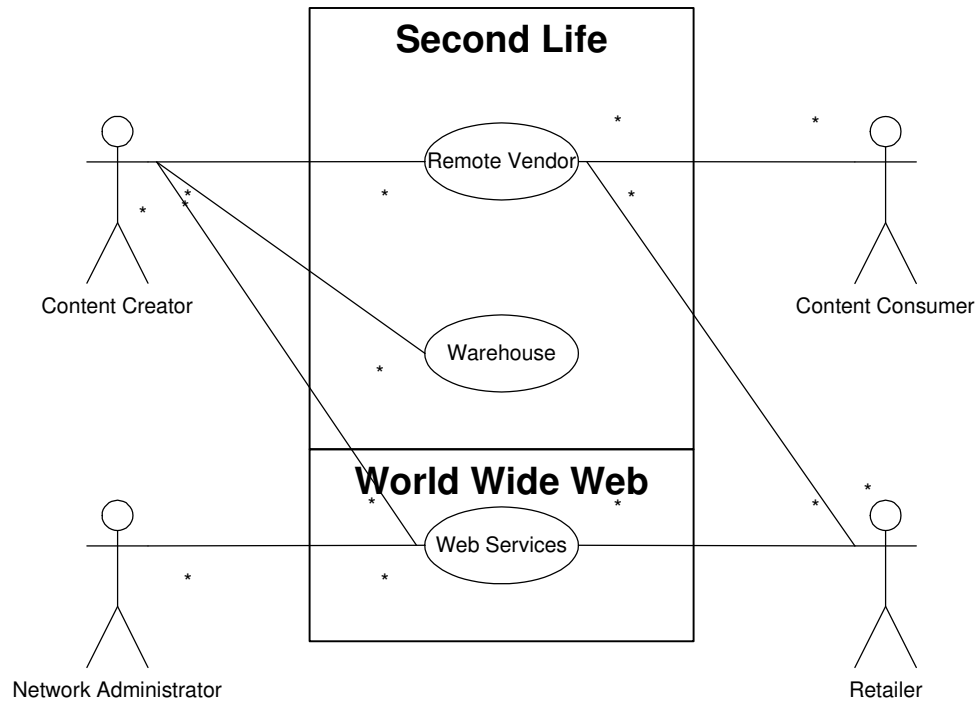
3.3. Database Back-End

3.3.1. New Purchase Detected

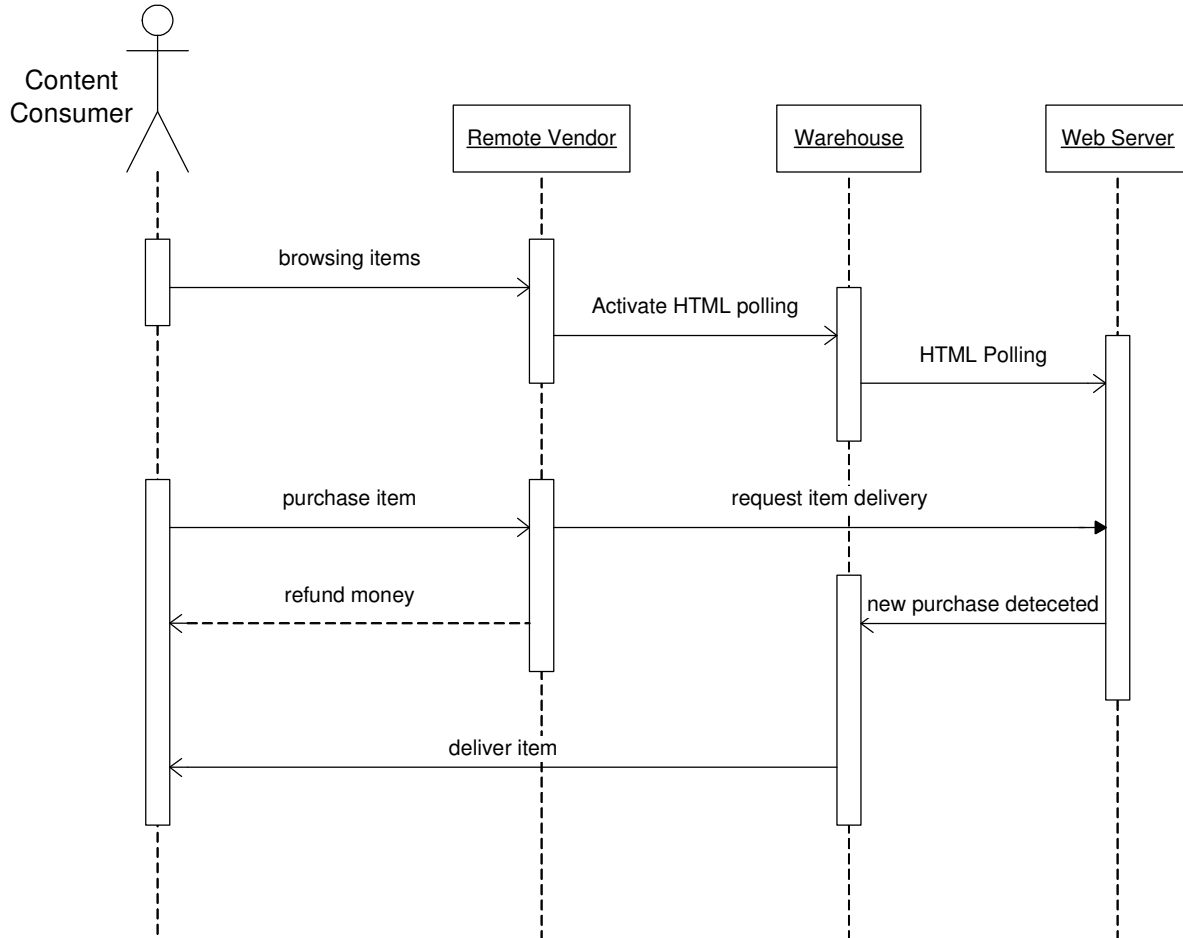
Function	Accepts HTTP requests and sends HTTP responses
Description	Allows the Warehouse inside of Second Life to know when a new purchase has been made
Inputs	Name of item, key of Content Consumer
Source	Remote Vendor
Outputs	<i>Reference: 3.1.6 Remote Procedure Calling; 3.2.2. HTML Poller</i> Name of item, key of Content Consumer
Destination	Warehouse
Action	<i>Reference: 3.2.3 Content Delivery</i> If HTML Poller is operating, Warehouse will know that a new purchase has been detected. Content Delivery will be activated.
Requires	<i>Reference: 3.3.1. Content Delivery</i> Functioning web server
Pre-condition	Application-level variables present
Post-condition	Application-level variables not present
Side effects	None

4. System Models

4.1. Use-Case Diagram



4.2. Sequence Diagram



5. Glossary

Below is a list of definitions for terms that are relevant to the domain of this system.

Avatar	An avatar or avatar shape is a three-dimensional representation of a member of Second Life. The members of Second Life have freedom to choose how they appear on the displays of other members.
Content	The word content in this document refers to virtual items that are created, sold or traded and owned by the members of Second Life. This virtual content includes: avatar shapes; clothing for the avatar shapes, accessories for the avatars such as jewelry; 3-D rendered buildings, 3-D rendered furnishings for those buildings; vehicles; games; and more.
Content Consumer	Refers to any member of Second Life who purchases content within Second Life.
Content Creator	Refers to any member of Second Life who creates virtual content within Second Life
Inventory	Every member of Second Life is given a personal inventory to store content that they have created themselves or have purchased from other members.
Key	Every member of Second Life is identified with a universally unique identifier, also known as a UUID. It consists of a 32 hexadecimal number.
Parcel	Synonymous with web space. This is the environment in which the Retailer maintains the Remote Vendor.
Remote Vendor	The interface that a Content Consumer interacts with inside Second Life to purchase content.
Retailer	Refers to any member of Second Life who markets and sells content within Second Life
Second Life	<i>Second Life</i> , abbreviated as SL throughout this document, is an online virtual environment developed and maintained by Linden Research, Inc. The members of SL access the servers hosting SL through a client-side program.
Network Administrator	Refers to any person, not necessarily a member of Second Life, who maintains the virtual vending system that allows the interactions between Remote Vendor and Warehouse to be possible.