

DESIGN OF MOBILE APPLICATIONS AND INFORMATION ARCHITECTURES

CPET 499 Mobile Computing Systems

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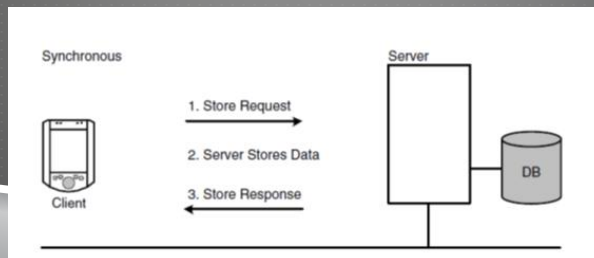
11-10-14

EXECUTIVE SUMMARY

- ▶ We were called in to review and discuss the current inventory system. The company was not happy with the current setup. After thoroughly studying the company's inventory process and speaking with several departments head and employees directly impacted by the current inventory process, the issues with the current inventory system were found to be a lack of visibility, accuracy in on hand inventory count, and lack of traceability. After this review was complete the company has identified a need for an improved inventory system. They have decided to move forward with a mobile inventory capture system. This system will allow the shipping and receiving department to use a mobile application loaded onto any of the company android phones to record the incoming inventory which will then be deposited into a database which will allow for better visibility and tracking.

INFORMATION SERVICE TYPE

- ▶ Synchronization Method
 - ▶ Portable.
 - ▶ Usable by any shipping or receiving clerk.
 - ▶ Reduction in Lead Time.
 - ▶ Sync achieved over local Wireless connection.

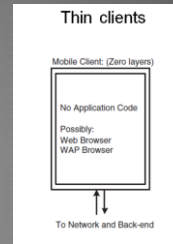


CONNECTION TYPE

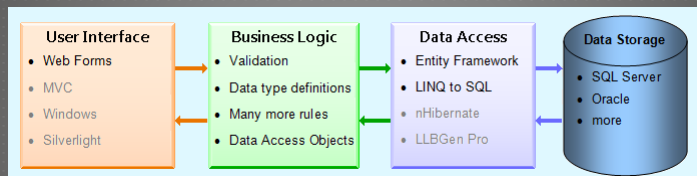
- ▶ Always-On Wireless Connection
- ▶ Local Campus-Area Wireless Network
 - ▶ Pre-existing
 - ▶ Easy integration with new product
 - ▶ Increase security

RESPONSIBILITIES AND REQUIREMENTS

- ▶ Client
 - ▶ Thin-Client Solution
 - ▶ No data stored locally
 - ▶ Browser-Operated
- ▶ Data Collection
 - ▶ Handled by Mobile Clients
 - ▶ Barcode Scanner software
 - ▶ Server will process data and add accordingly to DB



BUSINESS LOGIC



DATA ACCESS AND SHARING

- ▶ Data Sharing
 - ▶ Data collected by Mobile Client
 - ▶ Data processed and checked by server
 - ▶ Stored into SQL database.
- ▶ Database Access
 - ▶ SharePoint Dashboard
 - ▶ SharePoint will query database at regular intervals
 - ▶ Cross-Compatible

SERVICES

- ▶ Mobile Web Portal
 - ▶ Any device connected to the company's LAN will have access to SharePoint web interface
 - ▶ Increases Cross-Compatibility
- ▶ Email
 - ▶ SharePoint will monitor the quantities on hand and send email alerts when quantities are low.
- ▶ Reporting
 - ▶ SharePoint Dashboard provides flexible reporting tools.
 - ▶ Managers are able to specify exact data they need at the time.

USE-CASE SCENARIO

Use Case ID:	001		
Use Case Name:	Mobile Inventory Application		
Created By:	Chris Meisner, David Rash	Last Updated By:	Chris Meisner
Date Created:	11/08/14	Date Last Updated:	11/08/14
Actor:	Shipping and Receiving personnel		
Description:	Adding inventory via mobile application		
Preconditions:	<ol style="list-style-type: none"> 1. New Inventory has arrived and needs to be documented 2. Application software installed on mobile device 3. Mobile device connected to company intranet 4. Inventory application has been launch on the device 5. User uses mobile application to scan inventory barcode. 6. User enters quantity of scanned item 7. Data is passed to company server 8. Server passes data to inventory database 9. Database updates SharePoint dashboard with new inventory data 		
Post conditions:	<ol style="list-style-type: none"> 1. Inventory database has been updated showing new item quantity 2. SharePoint Dashboard has been updated to show new item quantity 		

USE-CASE SCENARIO (CONT..)

Priority:	I
Frequency of Use:	Weekly
Normal Course of Events:	The user will take the mobile device with the inventory application on it and scan the newly arrived inventory. Once the inventory has been scanned they will enter the quantity received. This information will be sent to the server which will update the database which will in turn update the dashboard.
Alternative Courses:	If for some reason the server is down the inventory will need to be taken manually then added at a later time.
Exceptions:	An exception may be a new piece of inventory has arrived which has not yet been added to the database. In this case this item will need to be added to the database then rescanned at another time.
Includes:	None
Special Requirements:	Wi-Fi connection to company intranet
Assumptions:	Company has an available server where the inventory database can be stored.
Notes and Issues:	None at this time

CONSIDERATIONS / CONSTRAINTS

- ▶ Scalability
 - ▶ Database and physical hardware can be easily and readily expanded if necessary.
- ▶ Openness
 - ▶ Software platform and database will be privately developed for the company.
- ▶ Heterogeneity
 - ▶ Although the Android platform is relatively cross-compatible, all devices will be the same at inception
 - ▶ There is no need to develop the application to work across different device types at this time.
- ▶ Fault Tolerance
 - ▶ Devices are thin-clients, and do not hold data themselves.
 - ▶ Servers are redundant with redundant switches and associated network hardware.

CONSIDERATIONS / CONSTRAINTS

- ▶ Resource Sharing
 - ▶ Mobile Application will share resources between the mobile device and servers
- ▶ Privacy/Security
 - ▶ Not a primary concern.
 - ▶ Devices can only operate on local LAN.
 - ▶ Communications are AES-encrypted over WLAN
- ▶ User Interface
 - ▶ Barcode Scanner
 - ▶ Reset and Submit function
 - ▶ Simple Design

CONSIDERATIONS / CONSTRAINTS

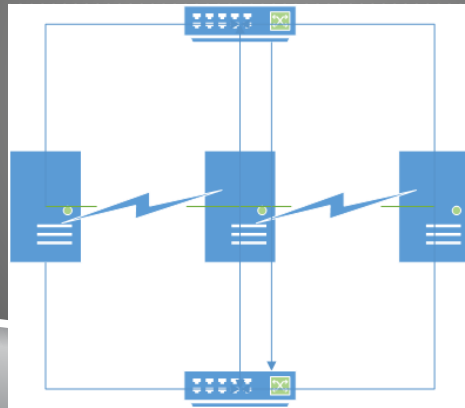
- ▶ Data Aggregation
 - ▶ Database designed so that all pertinent info will be collected and stored in the database
 - ▶ Available to any authorized user
 - ▶ Authorization controlled by Directory Server

SYSTEM DESIGN AND ARCHITECTURE

- ▶ System Design
 - ▶ Redundant Virtual Hypervisors
 - ▶ Redundant Storage Model (CEPH Block Storage)
 - ▶ No Single point of failure
 - ▶ Fencing implemented to avoid data corruption

SYSTEM DESIGN AND ARCHITECTURE

Figure demonstrating three redundant virtual hosts & switches



INTERFACES

- ▶ Communication Interface
 - ▶ Software on Mobile Devices
 - ▶ SharePoint for Data Access and Reports
- ▶ Security/Authentication Interface
 - ▶ Local LAN Operation
 - ▶ Thin Client Model reduces theft and loss considerations
 - ▶ AES Encryption over Wireless LAN
 - ▶ Authentication over Wireless via RADIUS Server
 - ▶ Authentication to SharePoint via Directory Server (AD)

HARDWARE STRUCTURE

- ▶ Servers
 - ▶ SAS (Serial-Attached SCSI) Drives
 - ▶ ECC (Error-Correcting Code) Memory
 - ▶ Redundant Hosts
- ▶ Mobile Client
 - ▶ Android (API 16)
 - ▶ Must have a rear-facing camera
 - ▶ “Dumb Terminals”

SOFTWARE STRUCTURE

- ▶ Data Relationship
 - ▶ Client-Server Model
- ▶ Software Structure of Server
 - ▶ Windows Server 2008 R2
 - ▶ MS SQL 2008 R2
 - ▶ SharePointWeb Server
- ▶ Software Structure of Mobile Client
 - ▶ Designed Software
 - ▶ SharePointWeb Interface (web browser)
- ▶ Middleware
 - ▶ Barcode Scanner Software (Open-Source Zxing Libraries)

TRADE-OFF ANALYSIS

Project parameter	Alternative 1	Alternative 2	Alternative 3
Customer/ key need Revision of Inventory Management System	SharePoint database with Android mobile scanners	Web-based database, proprietary scanners	Cloud (offsite) database, proprietary scanners
Critical features/specs	Open system with flexible configuration and reporting.	Reliable and well-developed technology	Reduces up-front cost and responsibility.
Technical Risks	Programming knowledge / end-product	End of support for proprietary system	Loss of internet connectivity halts operations
Other Risks	Android might change libraries / software becomes unavailable	Cost may be higher	Security of having data off-site

TRADE-OFF ANALYSIS

Schedule	Outlined in proposed project schedule document	Outside proposal necessary. Usually quick implementation	Outside proposal necessary. Usually very quick implementation
Product Cost	Hardware costs \$\$\$ Scanner costs \$ Development Costs \$\$\$ Recurring Cost -	Hardware costs \$\$\$ Scanner costs \$\$\$ Development Costs \$ Recurring Cost - \$	Hardware costs - Scanner costs \$\$\$ Development Costs - Recurring Cost -\$\$\$
Resources needed; Project Cost	High initial investment, no recurring cost.	High initial investment, low development cost. Low recurring cost.	No Hardware cost. High scanner cost. High subscription cost.

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