Central Virginia Food Bank

Information System Proposal

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Systems Analysis and Design

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7 December 2004

Project Description

About:

The Central Virginia Food Bank (CVFB) was founded in 1980 to gather and provide food for feeding programs throughout central Virginia, including 31 counties and six cities. CVFB distributes good through a network of over 500 partner agencies and nearly 150 child-care providers, and is provides more than 2,000 daily meals at times. Fiscal 2002 distributions exceeded 10 million pounds.

Requirements:

Current methods of accounting for donations and distributions are in need of modernization. Handheld computers, self check kiosks, inventory control tags, and a modern information system are needed to better serve the needs of the organization and the public as a whole.

Scope:

Allow CVFB clients and partner agencies to monitor real time inventory levels for online ordering applications. Staff should be able to coordinate food drives, food donations, and food distribution. Donors may request accurate donation records including distribution statistics such as quantity of people fed.

System Request

Business Need:

CVF's existing information system records donations and manages the inventory, keeping track of current quantity. Clients can check inventory quantities on a web site through an extranet. There is no real time inventory quantity functionality for clients, and the company is experiencing potential losses due to inaccurate inventory information. In addition, the amount of food distribution has steadily grown over the years, exacerbating the inventory problem.

Functionality:

Provide web services framework for real time inventory data

Provide inventory data to web services

Implement inventory web services on existing web site

Expected Value:

Tangible:	*Intangible:*
Reduce inventory losses by 10%.....$1,050,000.00**	Improve customer relationships
Increase donations by 10%.....$1,050,000.00**	Increase customer donations
Reduce inventory level checking.....$10,000.00	Reduce client response times
Reduce web inventory maintenance....$10,000.00	Increase awareness of customer needs

*Annual benefit **1lb of food is $1.29 Source: http://www.victoriafoodbank.org/faq.htm

Special Issues or Constraints:

Web site is hosted by and outside agency.

Feasibility Analysis

Technical feasibility (low to medium)

Familiarity with application (low)

The Central Virginia Food Bank (CVFB) has limited computer based applications experience.

The Information Systems consultants from VCU are unfamiliar with the application area.

System requirements are easily obtained and highly structured.

Familiarity with technology (moderate)

The CVFB members have limited information systems development expertise.

The Information Systems consultants from VCU are familiar with the enabling technology.

A new system can be implemented using commercial off the shelf software.

Must integrate new system with legacy system.

Project size (moderate)

Planned expansion of the service area, partner agencies, and amount of food distributed.

Incompatible application software (fundraising and inventory management).

Increased risk due to extended project length.

Economic feasibility (high)

Tangible costs and benefits:

156% ROI over a 5-year period.

Total benefits after 5 years of approximately $1,450,000 (adjusted for present value.)

Break-even Point: Approximately 1 year and 7 months. Break–Even Ratio: .739

Intangible costs and benefits:

Improve supplier/donor relationships

Improve services to clients

Increase supplier/donor base beyond 31 county area

Improve control managing inventory and scheduling tasks

Organizational feasibility (excellent)

Management:

Strong support from the CVFB leadership.

Transition scheduling should not coincide with rush periods.

Enhanced reporting will reduce potential legal liability.

Users:

Staff of CVFB, partners, clients, and suppliers interested in warehouse inventory levels.

It is expected that almost all users will enthusiastically receive the proposed system.

Other Stake-holders:

Volunteers will appreciate improved productivity as a result of increased automation.

Partner agency relationships will improve due to more robust tax and public service reports.

Additional comments:

Hardware, software, and communications fees should be set aside each year.

Limited funds for equipment upgrades and software development.

Website hosted by external agency will be replaced with in house hosting solution.

Improved control of managing inventory and scheduling tasks.

Web and database administrator required for new functionality.

Reduced waged staff will increase net benefit.

Increased data collection efficiency and accuracy

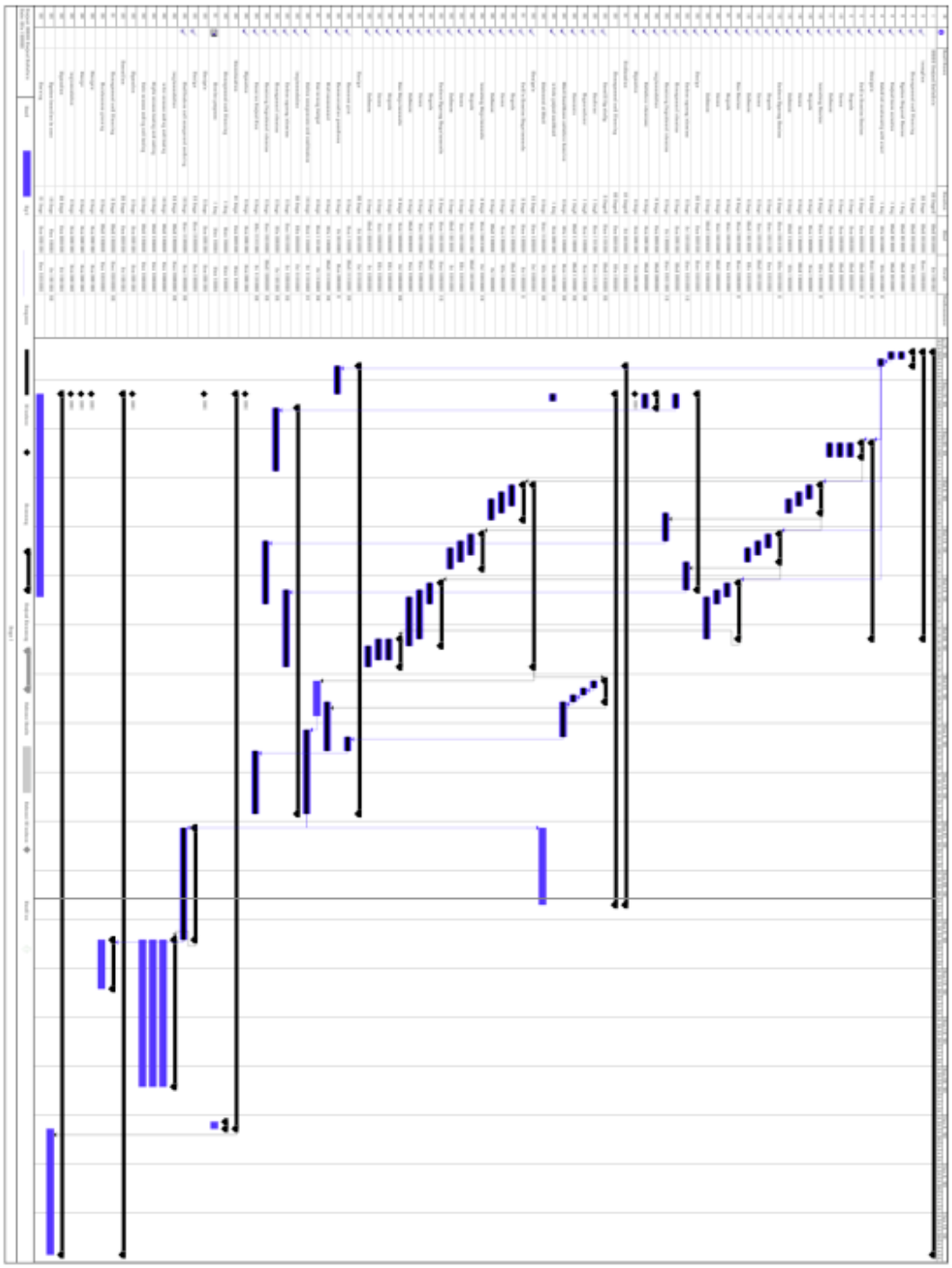
Potential donors will be more likely to participate with real-time Website inventory levels.

Savings allow for another distribution facility, leading to decreased fuel costs and spoilage.

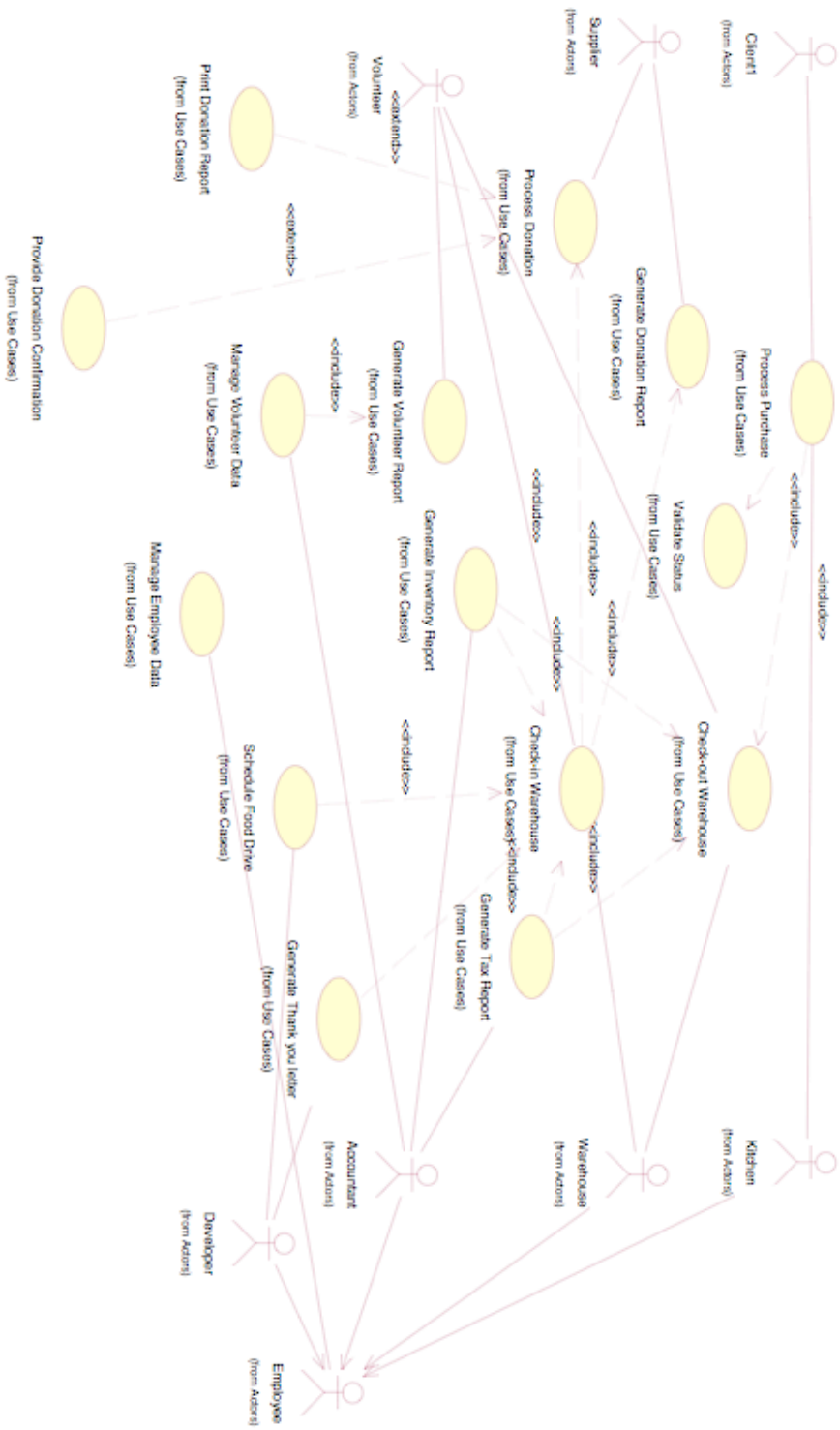
CVFB Cost/Benefit Analysis

	Year 1 ($)	Year 2 ($)	Year 3 ($)	Year 4 ($)	Year 5 ($)	Total ($)
Benefits						
Reduce inventory losses (spoilage)		$250,000.00	$250,000.00	$250,000.00	$250,000.00	$1,000,000.00
Improve volunteer utilization (eliminate waged temp. staff)		$50,000.00	$50,000.00	$50,000.00	$50,000.00	$200,000.00
Improve distribution logistics (reduce transportation fuel costs)		$100,000.00	$100,000.00	$100,000.00	$100,000.00	$400,000.00
Reduce cost of data collection (reduce paid staff)		$75,000.00	$75,000.00	$75,000.00	$75,000.00	$300,000.00
Total benefits		$475,000.00	$475,000.00	$475,000.00	$475,000.00	$1,900,000.00
PV of benefits (@ 8% discount rate)		$407,235.94	$377,070.31	$349,139.18	$323,277.02	
NPV of benefits (@ 8% discount rate)						$1,456,722.45
Development costs						
Labor:						
Analysis(640 hrs @ $50/hr)	$32,000.00	-	-	-	-	$32,000.00
Design(208 hrs @ $50/hr)	$10,400.00					$10,400.00
Programming and Web design (300 hrs @ $100/hr)	$30,000.00	-	-	-	-	$30,000.00
Documentation	$3,000.00	-	-	-	-	$3,000.00
Installation(48 hrs @ $75/hr)	$3,600.00	-	-	-	-	$3,600.00
Training	$8,000.00	-	-	-	-	$8,000.00
Hardware	$20,000.00	-	-	-	-	$20,000.00
Software	$50,000.00	-	-	-	-	$50,000.00
Total development costs						$157,000.00
Operational costs						
Software maintenance	-	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$4,000.00
Hardware maintenance	-	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$4,000.00
Additional Wages and Salaries						-
New IS Support Manager		$79,750.00	$83,738.00	$87,924.00	$92,321.00	$343,732.00
Database Administrator		$39,875.00	$41,869.00	$43,962.00	$46,160.50	$171,866.00
User training		-	$2,000.00	$2,000.00	$2,000.00	$6,000.00
Internet Service Provider fees		$2,400.00	$2,640.00	$2,904.00	$3,194.00	$11,138.00
Total operational costs	-	$124,025.00	$132,247.00	$138,790.00	$145,675.50	$540,736.00
Total costs	$157,000.00	$124,025.00	$132,247.00	$138,790.00	$145,676.00	$697,736.00
PV of total costs (@ 8% discount rate)	$0.00	$106,331.45	$104,981.93	$102,014.79	$99,144.64	
NPV of total costs (@ 8% discount rate)	$157,000.00					$569,472.81
Overall NPV						$887,249.64
Overall ROI						1.558019322
Net benefits	($157,000.00)	$350,975.00	$342,753.00	$336,210.00	$329,324.50	$1,202,264.00
Return on Investment						172.31%
Break-Even Analysis						
Yearly NPV Cash Flow	($50,000.00)	$300,904.49	$272,088.38	$247,124.39	$224,132.38	
Overall NPV Cash Flow	($50,000.00)	$250,904.49	$522,992.87	$770,117.26	$994,249.64	
Break-Even Ratio		0.738894737				

Gantt Chart



Use-Case Diagram



Flow-of-Events

Use Case Title: Schedule Food Drive
Primary Actor: Developer
Level: Kite
Stake-holders: Developer
Minimal Guarantee: Basic prospective donor list
Success Guarantee: Customized prospective donor list
Trigger: Heavy demand
Main Success Scenario: Customized donor list with historical data
1. Potential donor list generated from warehouse check-in
2. Analysis of historical data for individualization
3. Individualized food drive participation requests
Extensions:
1.a List cannot be generated
1.a.1 Error presented, list cannot be generated

Use Case Title: Generate Inventory Report
Primary Actor: Accountant
Level: Kite
Stake-holders: Accountant
Minimal Guarantee: Manual inventory report generation
Success Guarantee: Accurate up to the minute inventory report
Trigger: Accountant requests inventory report
Main Success Scenario: Warehouse check-in and check-out reconciled
1. Warehouse check-in reconciled
2. Warehouse check-out reconciled
3. Inventory report generated from warehouse status
Extensions:
1.a Check-in not reconciled
1.a.1 Error message generated
2.a Check-out not reconciled
2.a.1 Error message generated
3.a Inventory report not generated

Use Case Title: Generate Thank You
Primary Actor: Developer
Level: Kite
Stake-holders: Developer, Supplier
Precondition: Previous donation
Minimal Guarantee: Thank you card manually generated
Success Guarantee: Thank you card dynamically generated by system
Trigger: Request
Main Success Scenario: Thank you generated when requested by supplier
1. Aggregates suppliers warehouse check-ins
2. Calculates totals from warehouse data
3. Prints thank you card with appropriate data
Extensions:
1.a Unable to aggregate warehouse check-ins
1.a.1 Manual warehouse check-in record compilation
2.a Unable to calculate donation total
2.a.1 Manual calculations made
3.a Printer not working
3.a.1 Alert presented

Use Case Title: Generate Donation Report
Primary Actor: Supplier
Level: Kite
Stake-holders: Supplier
Precondition: Must have donated previously
Minimal Guarantee: Report generated from paper records
Success Guarantee: Supplier gets up to the minute report
Trigger: Supplier requests report
Main Success Scenario: Supplier selects generate report
1. Warehouse check-in is reconciled for supplier
2. Report generated from reconciliation
Extensions:
1.a Unable to reconcile warehouse check-in
1.a.1 Report cannot be generated
1.a.2 Accountant notified of issue

Use Case Title: Generate Tax Report
Primary Actor: Accountant
Level: Kite
Stake-holders: Accountant
Minimal Guarantee: Manual tax report generation
Success Guarantee: Accurate up to the minute tax report
Trigger: Accountant requests tax report
Main Success Scenario: Warehouse check-in and check-out reconciled
1. Warehouse check-in reconciled
2. Warehouse check-out reconciled
3. Tax report generated from warehouse history
Extensions:
1.a Check-in not reconciled
1.a.1 Error message generated
2.a Check-out not reconciled
2.a.1 Error message generated
3.a Tax report not generated

Use Case Title: Process Purchase
Primary Actor: Client, Kitchen
Level: Kite
Stake-holders: Client, Kitchen
Precondition: Must have purchase order
Minimal Guarantee: Paper form for purchase record and warehouse check out
Success Guarantee: Digital purchase record and warehouse check out
Trigger: Customer arrives at warehouse
Main Success Scenario: Leaves warehouse with food
1. Successful validation
2. Selects food to purchase
3. Pay for food
Extensions:
1.a Unsuccessful validation
1.a.1 Customer is denied access to food bank
2.a Food unavailable
2.a.1 Unable to check out for unavailable items
3.a Bill requested
3.a.1 Bill is generated and sent
3.b Cash paid
3.b.1 Receipt printed and cash accepted

Use Case Title: Generate Volunteer Report
Primary Actor: Volunteer
Level: Kite
Stake-holders: Volunteer, Accountant
Precondition: Volunteer has volunteered
Minimal Guarantee: Manual volunteer report
Success Guarantee: All volunteer hours reported
Trigger: Volunteer requests report
Main Success Scenario: Accurate report generated
1. Volunteer data reconciled
2. Generate report
Extensions:
1.a. Data not reconciled
  1.a.1 Error presented and
  1.a.2 Accountant notified

Use Case Title: Process Donation
Primary Actor: Supplier
Level: Kite
Stake-holders: Supplier, Warehouse
Minimal Guarantee: Manual inventory update and check-in
Success Guarantee: Inventory status update
Trigger: Food delivery
Main Success Scenario: Food is accepted
1. Warehouse receives food

Use Case Title: Manage Employee Data
Primary Actor: Accountant
Level: Kite
Stake-holders: Accountant, Employee
Precondition: Employee registration
Minimal Guarantee: Time records manually recorded
Success Guarantee: Time records automatically recorded
Trigger: Working
Main Success Scenario: Employee time records generated by system
1. Time records for employee compiled
Extensions:
1.a Time records not compiled
1.a.1 Error presented, manual audit necessary

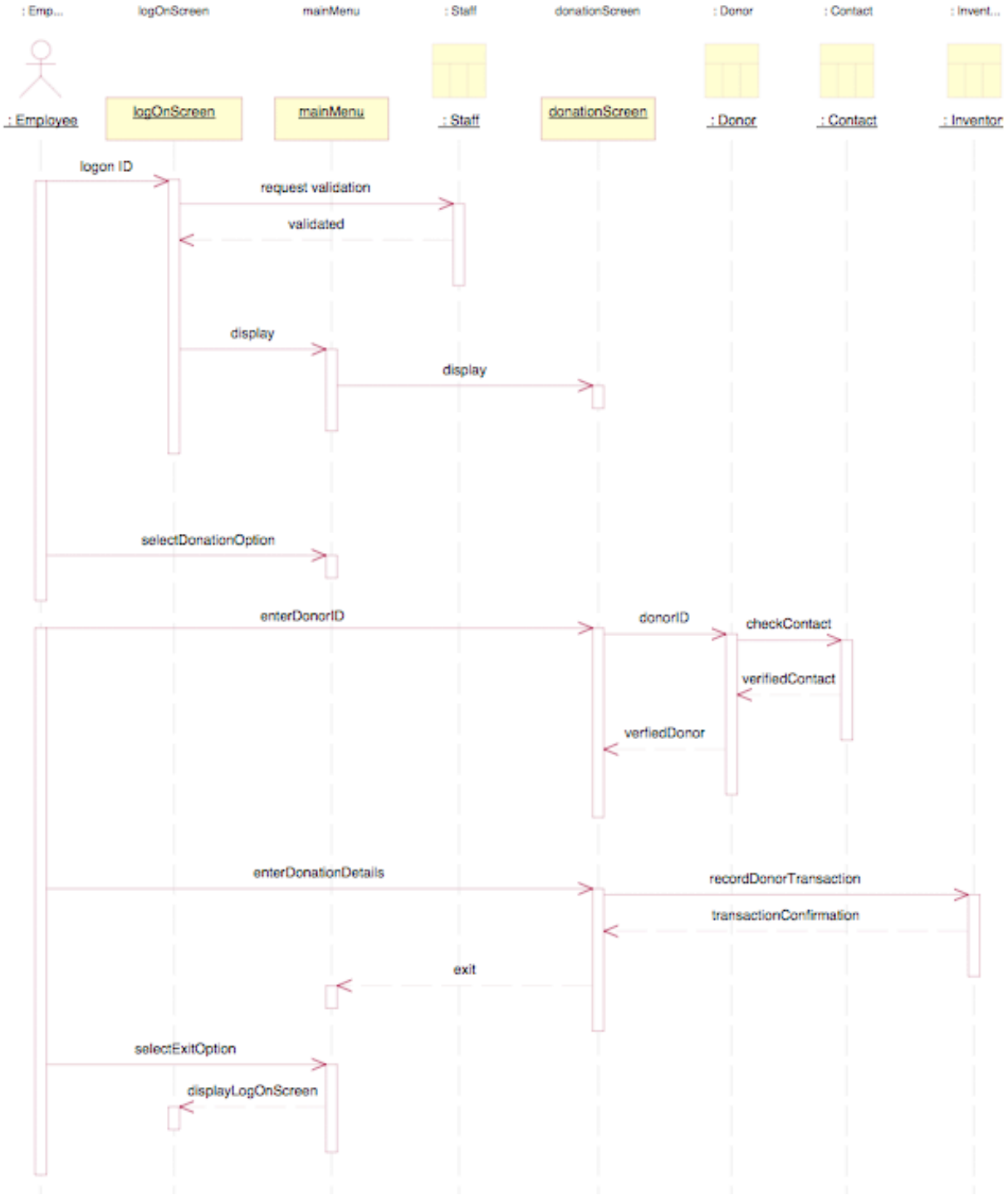
Use Case Title: Manage Volunteer Data
Primary Actor: Accountant
Level: Kite
Stake-holders: Accountant, Volunteer
Precondition: Volunteer registration
Minimal Guarantee: Time records manually recorded
Success Guarantee: Time records automatically recorded
Trigger: Volunteering
Main Success Scenario: Volunteer time records generated by system
1. Time records for volunteer compiled
Extensions:
1.a Time records not compiled
1.a.1 Error presented, manual audit necessary

Use Case Title: Validate Status (abstract)
Primary Actor: Client, Kitchen
Level: Kite
Stake-holders: Client, Kitchen
Precondition: Customer identifies themselves
Minimal Guarantee: Manual validation
Success Guarantee: User matches existing entry in database
Trigger: Make purchase
Main Success Scenario: Customer validated
1. Customer logs in to system
2. Validation successful
Extensions:
1.a Customer cannot log in
  1.a.1 Error message
2.a Validation unsuccessful

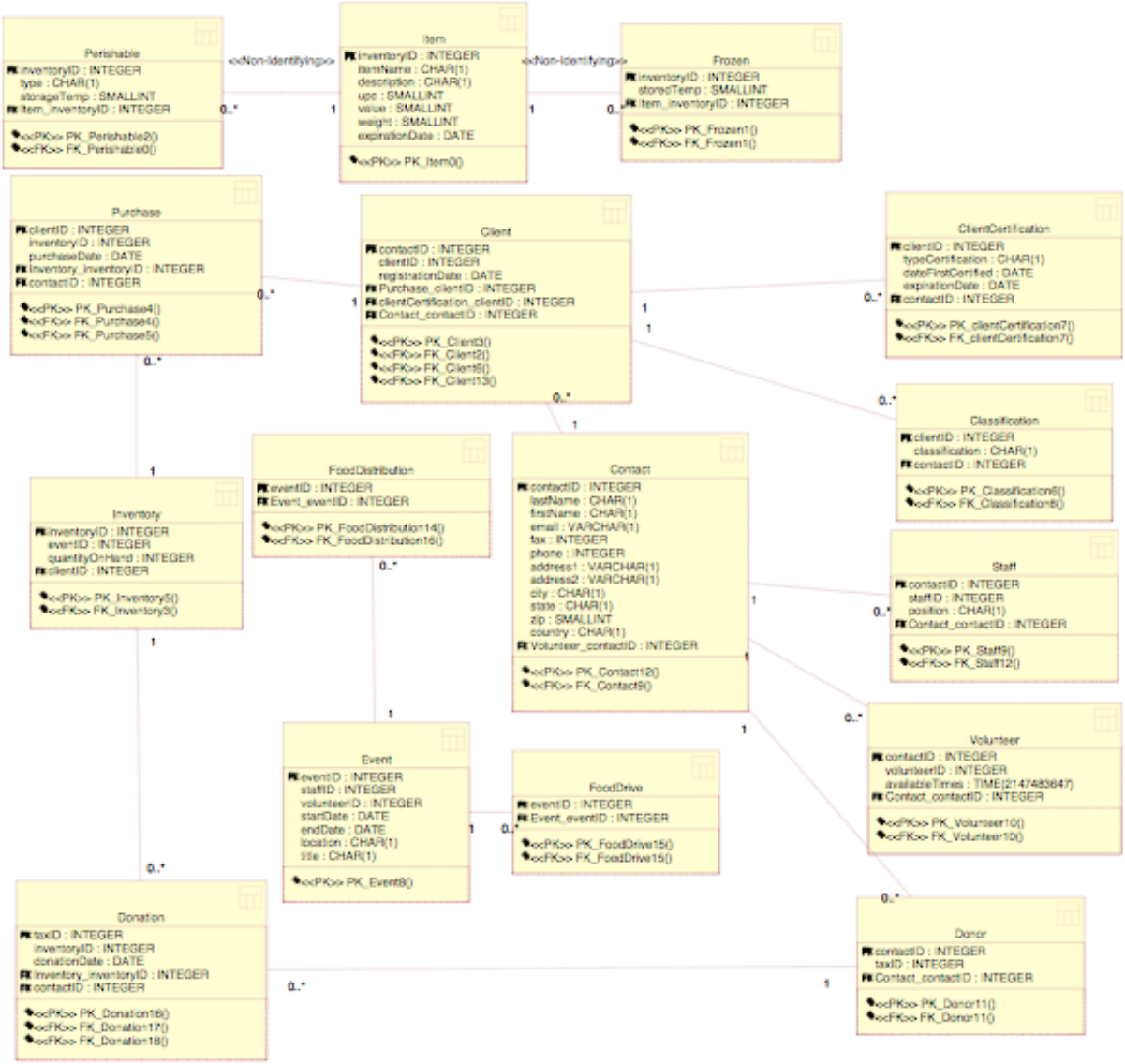
Use Case Title: Check-In Warehouse
Primary Actor: Warehouse
Level: Kite
Stake-holders: Warehouse, Supplier
Precondition: Food is delivered
Minimal Guarantee: Manual inventory check-in
Success Guarantee: Inventory status updated and food rotated
Trigger: Make donation
Main Success Scenario: Food rotated and checked-in
1. Food checked in
2. Food rotated
Extensions:
1.a Food spoiled
  1.a.1 Food is not checked-in

Use Case Title: Check-out Warehouse
Primary Actor: Warehouse, Volunteer
Level: Kite
Stake-holders: Client
Precondition: Make purchase
Minimal Guarantee: Manual inventory record deduction
Success Guarantee: Inventory database deduction
Trigger: Customer presents item selection
Main Success Scenario: Rapid check-out
1. Warehouse compiles food
2. Inventory status deduction
3. Food is delivered
Extensions:
1.a. Customer compiles food
2.a Manual inventory status deduction

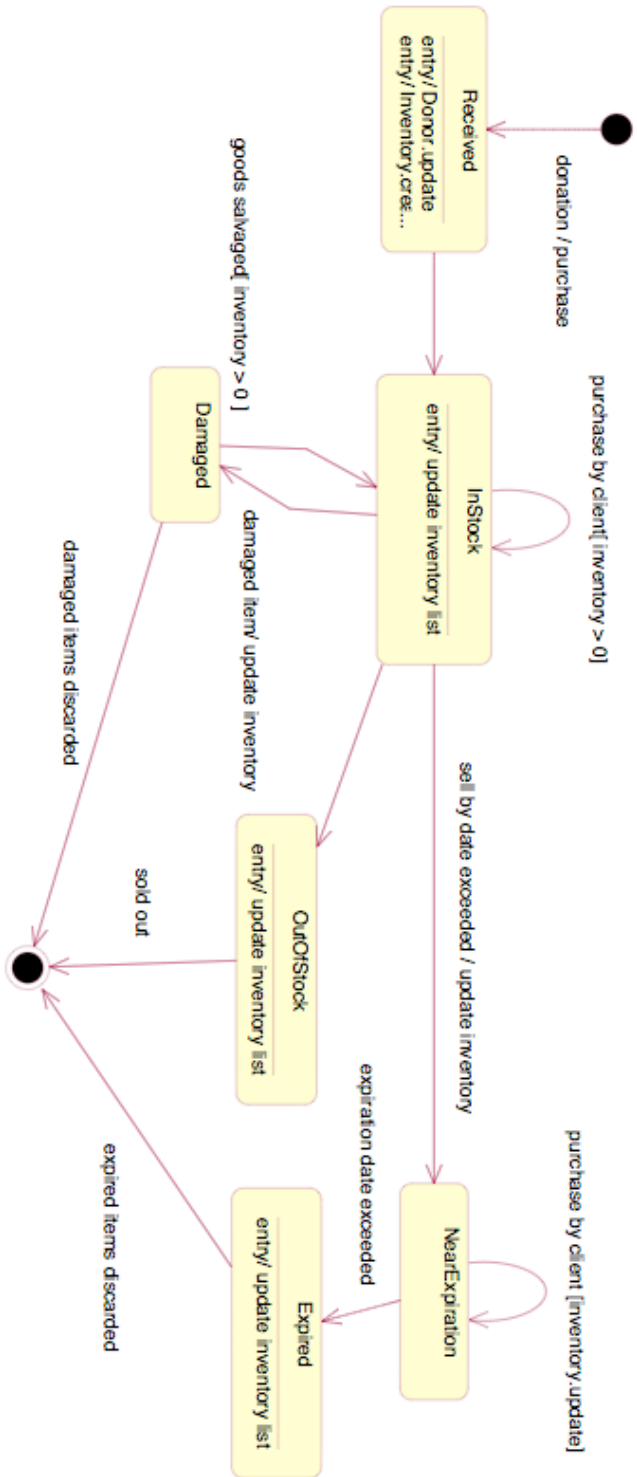
Sequence Diagram



Normalized Data Model

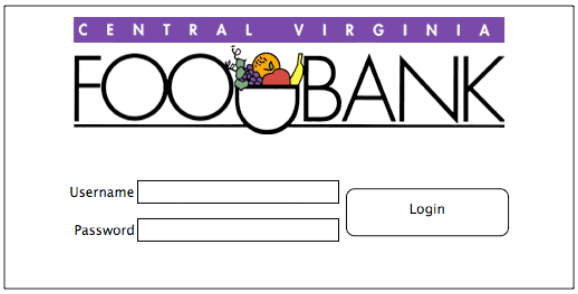


Statechart Diagram

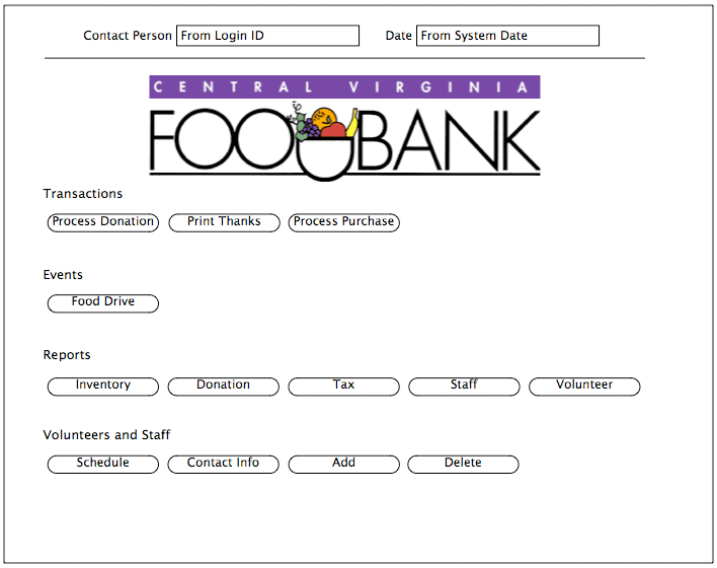


User Interface Prototypes

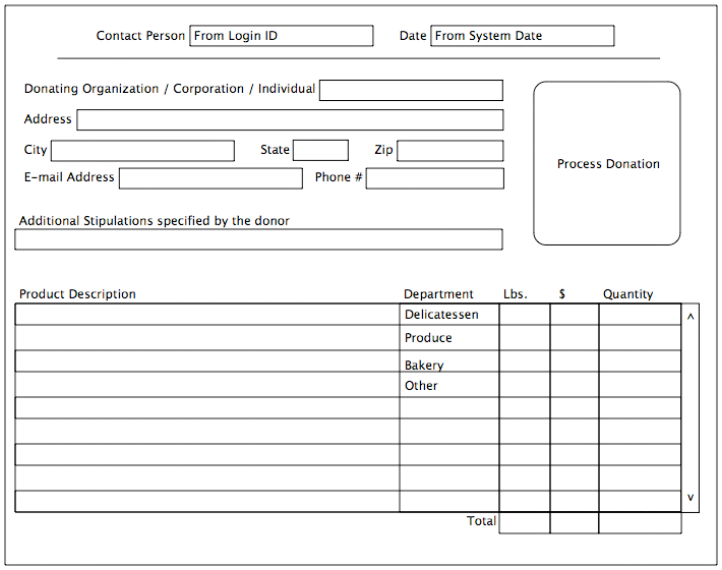
Login to CVFB



Main Menu



Process Donation



Executive Summary

What Has Been Done:

Students took part in the initial systems analysis and design for the development of this twenty-first century food bank information system. Project feasibility was assessed and a baseline project plan was developed. System requirements were determined, and structured with use-case descriptions and diagrams. Conceptual models were translated into object relations. Analysis classes were developed to define data and behavior. Human interface prototypes were designed for the end user in mind.

What Needs to Be Done:

Handheld computers, self check kiosks, inventory control tags, and alternative information systems need to be evaluated. Physical implementation and operation, including training and transition to the new information system need to be scheduled and enacted.

How to Proceed:

Following project approval, information systems students will take part in the implementation of the new CVFB information system. This new system should be developed as an open-source application allowing food banks across the country to implement similar functionality.