1. Introduction

While it's true that we are now in the so-called Information Age, it's good to keep in mind that there are still many industries in which computers do not play a dominant role in day-to-day processes. Typically, these industries have a very long tradition, with processes and techniques that are passed on from masters to apprentices, generation after generation. However, as a reality check, unless it's a completely niche industry, chances are that companies who do not embrace new technologies will find themselves with a huge competitive disadvantage against competitors who have done so. We believe that by implementing a new order processing system for XYZ Printing Co. we can help propel the company into the 21st century without interfering with company values and other long standing traditions of the trade; but rather enhancing their ability to grow and adapt into this new way of doing business on a global scale.

1.1 Purpose of the system

To facilitate and automate production for XYZ printing Co. To provide a uniform interface for customer order submission, employee workflow, and management activities - this will enhance productivity and efficiency.

1.2 Scope of the system

The system will consist of a website front-end for customers place orders and track progress; and a back end to allow managers and workers to receive, organize and schedule customer orders for production.

1.3 Objectives and success criteria of the project

To centralize and streamline order entry and processing. Success Scenario: Order entry is done solely by customers, without need to call the print company. No orders are lost due to human error during processing. Production times should be reduced by 20%, from current baseline.

1.4 Definitions, acronyms, and abbreviations

- PWAS: Printshop Workflow Automation System, the name of the proposed system.

1.5 References

1.6 Overview

This is a custom-built system, specifically to meet XYZ Printing Company's needs. It will be customized to help the company manage incoming orders and enhance production, thus saving the cost of hiring additional personnel. In the next sections, the challenges faced by the company will be explained in more detail, along with the proposed solutions.

2. Current system

Orders are submitted by customers, using various methods. For example, one customer might submit an order by email, another may submit one in person, and a third may choose to use the postal service. Employees receive individual orders and create corresponding job tickets based on the customer's requirements. New orders are printed and placed in a folder, where plant managers will physically sort and aggregate them, according to size, quantities and stocks to be used. These aggregations are then run in gang-style print runs, where many orders are processed simultaneously.

3. Proposed system

3.1 Overview

Printshop Workflow Automation System ("PWAS") is a web-based order taking and tracking portal. It will allow customers to place and track orders online, providing them updates at each production milestone. The system will allow employees to organize customer orders into print runs and track their completion status. System administrators will be able to manage existing user accounts or add new ones. User-access control will be provided to differentiate views of the system between customers, employees, and administrators.

3.2 Functional requirements

The proposed system shall provide the following major characteristics:

- The system shall allow customers to place and track orders, utilizing a payment method of their choice.
- The system shall allow customers to view their order history and account information.
- The system shall allow employees to organize, track and complete customer orders.
- The system shall allow administrators to manage user accounts, customer orders and printing properties.
- The system shall have user access control for security and access differentiation.

3.3 Nonfunctional requirements

3.3.1 Usability

The user interface should understandable to non-technical customers, allowing them to submit, view, and edit orders. The logo should not have any religious, political, racist, sexual, or discriminatory connotations. Fonts should be clear and easy to read. Color scheme should be light background with dark foreground, to maximize contrast. There will be various help options for customers that explain the order submission and tracking processes.

3.3.2 Reliability

The system should be highly available, with 99% up time. System maintenance should be done on weekends, between 12am and 7am, occurring less than twice per month.

3.3.3 Performance

The system will respond within thirty seconds for any user action, including work-order submission, order tracking, and any other user interaction with the system. The system should be available during business hours 99% of the time, with downtime allowed as specified by Section 3.3.2.

3.3.4 Supportability

The system will not interfere with previously created orders or with the history of previous transactions. System maintenance should handle all updates required to fix defects, or handle change requests. The system will be available only in English. The system is web-based, so it is compatible with any operating system that can run a supported web-browser and connect to the Internet

3.3.5 Implementation

The system will be web-based. It will support Internet Explorer 7+ and Firefox 3+. It should be implemented in a programming language that is cross-platform, so no porting will be required to change platforms.

3.3.6 Interface

The system will interface with a credit card processing service.

3.3.7 Packaging

Personalized installation/configuration will be offered by the software company. The product may be hosted internally by the customer, or deployed on the customer's servers.

3.3.8 Legal

The system does not have any legal requirements. No government or security clearance is necessary. The system is not implemented to comply with any particular disability users may have.

3.4 System models

3.4.1 Scenarios

Scenario Name	userAdministration
Participating actor instances	lenny:Administrator
Flow of events	1. Lenny logs into the system and selects the "View User Account" function on the PWAS website. 2. PWAS responds by displaying a list of all users registered with the system. 3. Lenny chooses a particular user account. 4. PWAS responds by displaying a detailed, read-only, summary of that account. 5. Lenny reviews the information, then selects the "Edit User Account" function on the PWAS website. 6. PWAS responds by making the user account editable. Lenny changes the user's address and saves his changes. 7. PWAS responds by confirming Lenny's request and updating the user's record. 8. Lenny then selects a former employee and selects the "Delete Account" function on the PWAS website. 9. PWAS responds by confirming Lenny's request and deleting the user's record.

Scenario Name	orderAdministration
Participating actor instances	lenny:Administrator
Flow of events	1. Lenny logs into the system and selects the "View Orders" function on the PWAS website. 2. PWAS responds by displaying a list of all orders contained within the system. 3. Lenny selects a particular customer order. 4. PWAS responds by displaying a detailed, read-only, summary of that order. 5. Lenny reviews the information, then selects the "Edit Order Status" function on the PWAS website.

	6. PWAS responds by making the order editable. 7. Lenny changes the order's status and saves his changes. 8. PWAS responds by confirming Lenny's request and updating the order's record. 9. Lenny then selects a canceled order and selects the "Delete Order" function on the PWAS website. 10. PWAS responds by confirming Lenny's request and deleting the canceled order.

Scenario Name	viewWorkedProcess
Participating actor instances	lenny:CustomerService
Flow of events	1. Lenny logs into the system and select view "order info" function on PWAS website. 2. PWAS return to Lenny a list of current orders into the system. 3. Lenny chooses John's order to see its information. 4. PWAS return to Lenny all information about John’s order. 5. Lenny checks the information.

Scenario Name	createWorkedProcess
Participating actor instances	bob:CustomerService
Flow of events	1. Bob logs into the system. 2. Bob activates the "Create Order" function on the PWAS website. 3. PWAS returns to Bob a form containing all the specifications of an order. 4. Bob fills out the form and selects that she wants to print his business flyer, also selects the type of paper he wants to print it on, whether he wants to print full color or black and white, and uploads his design as well using the form. 5. After creating the order, PWAS asks Bob whether he wants to pay the order now, or save it to pay later. 6. Bob chooses to save the order and pay for it later., so his order is saved.

Scenario Name	preprinting
Participating actor instances	alice, bob:Employee
Flow of events	1. Alice logs into the system and selects the "View Work Pool" function on the PWAS website. 2. PWAS responds by displaying a view of all customer orders that have yet to be sorted into a print run, along with relevant

	details. 3. Alice selects an order to examine in further detail. PWAS responds by displaying a detailed view of that specific order. 4. Alice returns to the list of all customer orders yet to be sorted into a print run. 5. PWAS responds by displaying a view of all customer orders that have yet to be sorted into a print run. 6. Alice selects the "Create Print Run" function of PWAS. 7. PWAS responds by creating an empty print run and notifying Alice. 8. Alice selects the "Edit Run" function of PWAS, with the new print run selected. 9. PWAS responds by showing Alice a form with options to add / remove orders to the print run. 10. Alice adds five orders to the print run. 11. PWAS responds by updating the status of the print run and notifying Alice. 12. Alice selects the "Submit Run To Printing" function of PWAS. 13. PWAS confirms Alice's choice, then finalizes the changes to the new print run, updates its status, and notifies the proper employees that a new job is ready for printing.

Scenario Name	customerOrdering
Participating actor instances	alice: User
Flow of events	1. Alice logs into the system and selects the "Create Order" function on the PWAS website. 2. PWAS responds by displaying a form containing all the specifications of an order. 3. Alice fills out the form with all relevant details. PWAS responds by confirming Alice's choices and asking her whether she wants to pay the order now, or save it to pay later. 4. Alice chooses to pay the order later, so her order is saved and she is redirected into the Payment function of PWAS. 5. Later, Alice logs in and selects to submit and pay for her saved order, but makes a mistake when filling out her billing information. 6. PWAS responds by notifying Alice that her billing information is invalid, and asking her to check for errors. 7. Alice corrects the mistake and resubmits the order form. 8. PWAS responds by confirming her order, submitting her order, and processing the payment. 9. Later, Alice logs in and selects the "Order Tracking" function of PWAS. 10. PWAS responds by displaying a list of all her orders, including previously saved orders and submitted orders. 11. Alice selects her most recent order.

	12. PWAS responds by displaying all relevant details of her order.

Scenario Name	register
Participating actor instances	bob: User
Flow of events	1. Bob selects the "Register" function on the PWAS website. 2. PWAS responds by displaying a form containing all information needed to register a new user. 3. Bob enters his full name, username, password, email address, and home address, then submits the form. 4. PWAS responds by confirming Bob's choice, creating his account and emailing Bob with his account information.

Scenario Name	login
Participating actor instances	bob: User
Flow of events	1. Bob selects the "Login" function on the PWAS website. 2. PWAS responds by displaying a form with username and password fields. 3. Bob enters his username and password, but makes a mistake, then submits the form. 4. PWAS responds by telling Bob that his username / password combination is invalid. 5. Bob corrects his mistake and submits the form. 6. PWAS responds by granting Bob access to the system.

Scenario Name	logout
Participating actor instances	bob: User
Flow of events	1. Bob selects the "Logout" function on the PWAS website. 2. PWAS responds by confirming Bob's choice and logging Bob out of the system.

Scenario Name	printing
Participating actor instances	bob: User
Flow of events	1. Bob logs into the system and selects the "Printing" function on the PWAS website. 2. PWAS responds by displaying a list of orders that are ready for printing. 3. Bob selects an order to be printed, according to the queue,

	prints the order, and submits the information to PWAS. 4. PWAS responds by confirming Bob's choice and updates the print run's status to "Printed".

Scenario Name	finishing
Participating actor instances	bob: User
Flow of events	1. Bob logs into the system and selects the "Finishing" function on the PWAS website. 2. PWAS responds by displaying a list of orders that are ready for finishing. 3. Bob selects an order to be finished, according to the queue, finishes the order, and submits the information to PWAS. 4. PWAS responds by confirming Bob's choice and updates the print run's status to "Finished".

Scenario Name	shipping
Participating actor instances	bob: User
Flow of events	1. Bob logs into the system and selects the "Shipping" function on the PWAS website. 2. PWAS responds by displaying a list of orders that are ready for shipping. 3. Bob selects an order to be shipped, according to the queue, ships the order, and submits the information to PWAS. 4. PWAS responds by confirming Bob's choice and updates the print run's status to "Shipped".

3.4.2 Use Case Model

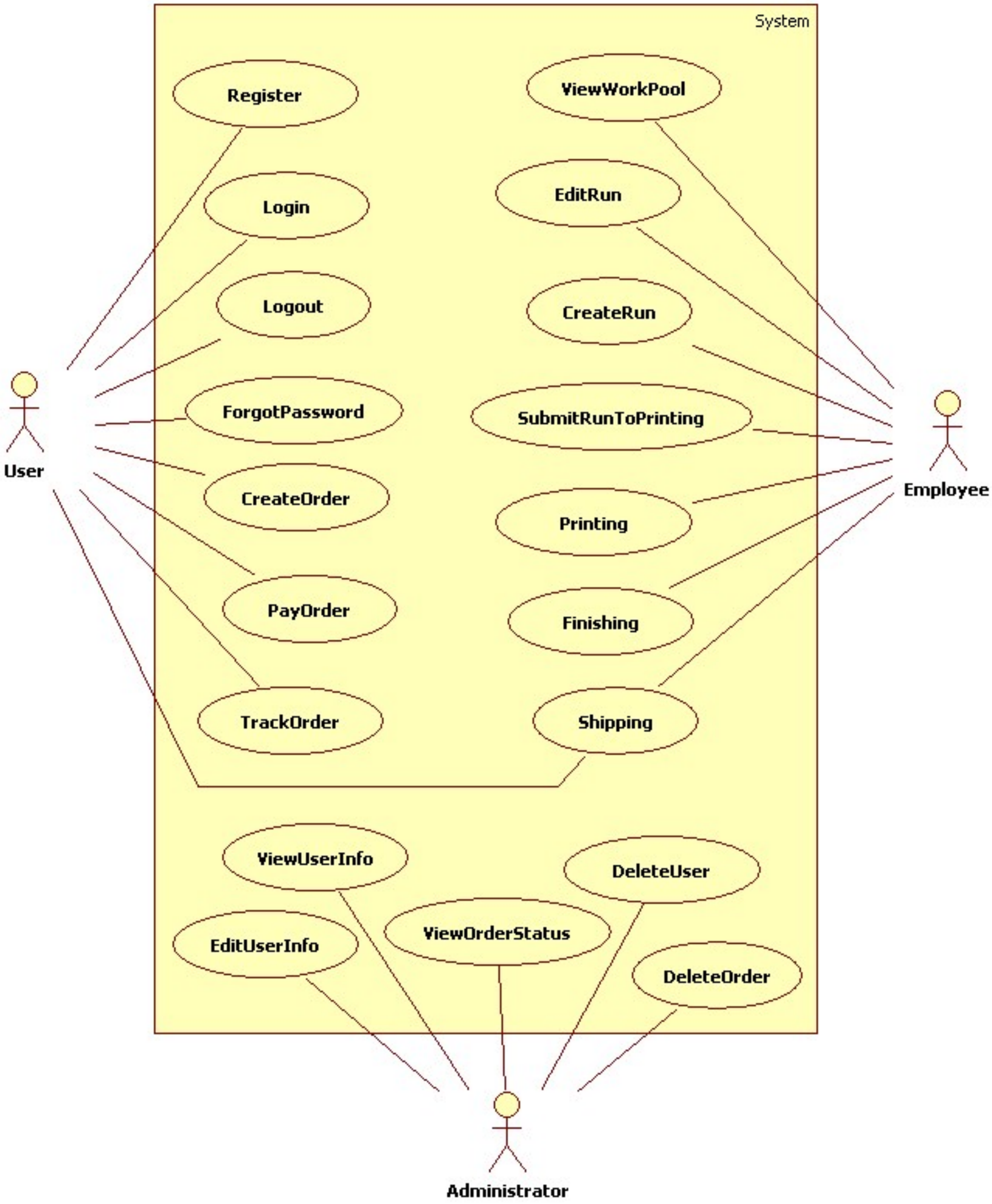

Figure 1 – Use Case Diagram for PWAS

Use case Name	ViewUserAccount
Participating Actors	Administrator
Flow of Events	1. Administrator activates "User info" function 2. System display the list of users 3. Administrator selects a user to see his/her information. 4. System display the user's information 5. Administrator checks the information.
Entry Conditions	• Administrator is logged into the system
Exit Conditions	• Administrator has viewed the information.
Exception	• No Exceptions

Use case Name	EditUserAccount
Participating Actors	Administrator
Flow of Events	1. Administrator activates "Edit User" function 2. System display a form already fill out with previous information 3. Administrator edit the information 4. System confirms that the modifications were success. 5. Administrator submit the information 6. System confirm modifications
Entry Conditions	• Administrator has a user account. • Administrator is logged into the system • Administrator has selected the user information.
Exit Conditions	• The information is successfully updated
Exception	• Administrator cancel the edit process

Use case Name	DeleteUserAccount
Participating Actors	Administrator
Flow of Events	1. Administrator activate “delete user” function 2. Administrator delete the user 3. System confirms the deletion process. 4. Administrator Submit changes
Entry Conditions	• Administrator has a user account. • Administrator is logged into the system • Administrator has selected the user information.
Exit Conditions	• The user is successfully deleted
Exception	• Administrator cancels the deletion process. • The user can't be deleted because of holds (debts, hold orders).

Use case Name	ViewOrderStatus
Participating Actors	Administrator
Flow of Events	1. Administrator activate “view info” function 2. System displays the list of current orders. 3. Administrator Select one order to see its status. 4. System display the order's information 5. Administrator check information
Entry Conditions	• Administrator has a user account. • Administrator is logged into the system • Administrator has selected the user information
Exit Conditions	• Administrator has viewed the information.
Exception	• No Exceptions

Use case Name	EditOderStatus
Participating Actors	Administrator
Flow of Events	1. Administrator activates "Edit Order Status" function 2. System display a form already fill out with previous information 3. Administrator edit the information 4. System confirms that the modifications were success. 5. Administrator submit the information 6. System confirm modifications
Entry Conditions	• Administrator has a user account. • Administrator is logged into the system • Administrator has selected the order status information
Exit Conditions	• the information is successfully updated
Exception	• Administrator cancel the edit process

Use case Name	DeleteOrderStatus
Participating Actors	Administrator
Flow of Events	1. Administrator activate “Delete Order” function 2. Administrator delete the order 3. System confirms the deletion process. 4. Administrator Submit changes
Entry Conditions	• Administrator has a user account. • Administrator is logged into the system • Administrator has selected the order information
Exit Conditions	• The order is successfully deleted
Exception	• Administrator cancels the deletion process. • The order can't be deleted because of holds.

Use case Name	ViewWorkedProcess
Participating Actors	Customer Service
Flow of Events	1. Customer Service Customer Service activate “View Info” function 2. System displays the list of current orders. 3. Customer Service Select one orders to see its status. 4. System display the order's information 5. Customer Service check information
Entry Conditions	• Customer Service has a user account. • Customer Service is logged into the system • Customer Service has selected the user information.
Exit Conditions	• Customer Service has viewed the information.
Exception	• No Exceptions

Use case Name	CreateWorkedProcess
Participating Actors	Customer Service
Flow of Events	1. Customer Service activates the “Create Order” function on the system 2. The System responds by showing the “Create Order Form” 3. Customer Service fills out the order form by selecting all the specs of the order, and uploads the file that will be printed. 4. After filling out the form the User is given the option of either saving the order for later payment, or proceeding to the “Pay Order” function right away.
Entry Conditions	• Customer Service is logged into the system
Exit Conditions	• The order is successfully created into the system
Exception	• Customer Service cancels the order creation.

Use case Name	ViewWorkPool
Participating Actors	Initiated by an Employee
Flow of Events	1. User initiates the “View Work Pool” function of the system 2. The System responds by presenting a view of all available customer orders to fill, along with a brief summary of the information relevant to creating print runs 3. The User may select an order to see details of a specific order 4. The System responds by showing all details of a specific order
Entry Conditions	• User is logged into the system
Exit Conditions	• The User has completed viewing the available customer orders OR • The User selects "Create Print Run"
Exception	• No exceptions

Use case Name	CreateRun
Participating Actors	Initiated by an Employee
Flow of Events	1. User initiates the "Create Print Run" function of the system 2. The System responds by creating an empty print run and notifying the User
Entry Conditions	• User is logged into the System
Exit Conditions	• The User has completed creating a print run OR • The User selects "Edit Run"
Exception	• No exceptions

Use case Name	EditRun
Participating Actors	Employee
Flow of Events	1. The User initiates the "Edit Run" function 2. The System responds by showing the User a form with options to add/remove orders to the print run 3. The User adds or removes orders to / from the print run 4. The System updates the status of the print run
Entry Conditions	• User is logged into the system • User has selected an existing un-submitted print run to edit
Exit Conditions	• A print run has been edited and saved OR • The User selects "Submit Run To Printing"
Exception	• No exceptions

Use case Name	SubmitRunToPrinting
Participating Actors	Employee
Flow of Events	1. The User initiates the "Submit Run To Printing" function 2. The System confirms the User's choice 3. The System notifies Employee that a new print run is ready for printing
Entry Conditions	• User is logged into the system • User has selected a print run
Exit Conditions	• The print run's status has been updated to reflect it's now in the 'printing' phase
Exception	• No exceptions

Use case Name	Register
Participating Actors	User
Flow of Events	1. User activates the "Register" function 2. The System responds with a form for the User to fill out 3. User provides required information (Full Name, Username, Password, Email address, home address) 4. User submits form

	5. User receives a confirmation message that his account is created 6. User receives an email (to his provided email address) with the account information
Entry Conditions	• None
Exit Conditions	• User has a working username / password combination to login to the system
Exception	• Email Password is not valid • Password does not meet security requirements • Required information is missing from the form

Use case Name	Login
Participating Actors	User
Flow of Events	1. User activates the "Login" function 2. The System responds with a form for the User to fill out 3. User provides correct username and password 4. User submits login form
Entry Conditions	• User is registered in the System
Exit Conditions	• User is authenticated in the system • User is redirected to the home page
Exception	• Username or password field is left empty. • Incorrect username or password is entered.

Use case Name	Logout
Participating Actors	User
Flow of Events	1. User activates the "Logout" function 2. The System prompts the User for confirmation 3. User confirms logout
Entry Conditions	• User is logged into the system
Exit Conditions	• User is logged out of the system • User is redirected to the home page
Exception	• No Exceptions

Use case Name	ForgotPassword
Participating Actors	User
Flow of Events	User has a valid login
Entry Conditions	1. User activates the "Forgot Password" function 2. The systems prompts the User for a username 3. User enters valid username 4. User submits form
Exit Conditions	• System sends the password to the email address stored for the username entered • System displays status message

Exception	• The username entered is not found in the system

Use case Name	CreateOrder
Participating Actors	User
Flow of Events	1. User activates the “Create Order” function on the system 2. The System responds by showing the “Create Order Form” 3. User fills out the order form by selecting all the specs of the order, and uploads the file that will be printed. 4. After filling out the form the User is given the option of either saving the order for later payment, or proceeding to the “Pay Order” function right away.
Entry Conditions	• User is logged into the system
Exit Conditions	• The User has created an order into the system.
Exception	• No Exceptions

Use case Name	PayOrder
Participating Actors	User
Flow of Events	1. The System shows the User a Payment Form. 2. The User enters the Payment information into the Payment Form and submits it.
Entry Conditions	• An Order has been selected for payment
Exit Conditions	• The order has been paid.
Exception	• If the payment information that the User entered is not correct, the System will let User know, and allow User to re-enter this information

Use case Name	TrackOrders
Participating Actors	User
Flow of Events	1. User activates the “Order Tracking” function of the System. 2. The System shows the User a list of orders belonging to this User. 3. The User selects an Order. 4. The System returns to the User the details about the Order.
Entry Conditions	• The User initiating function already has orders in the System
Exit Conditions	• The User sees the Order Tracking information
Exception	• The User doesn't have any order on the system.

Use case Name	Printing
Participating Actors	Employee
Flow of Events	1. User activates ‘Printing’ 2. System presents job information 3. System updates the job status as “Printed”
Entry Conditions	• User is logged into the system • Job status is “Ready for printing”
Exit Conditions	• Status updated to “Printed”
Exception	• No exceptions

Use case Name	Finishing
Participating Actors	Employee
Flow of Events	1. User activates “Finishing” 2. System presents job information 3. User marks the job as done 4. System notifies that it is ready for “Shipping”
Entry Conditions	• User is logged into the system • Job status is “Printed”
Exit Conditions	• Status updated to “Shipping”
Exception	• No Exceptions

Use case Name	Shipping
Participating Actors	Employee
Flow of Events	1. User activates ‘Shipping’ 2. System presents job information 3. Shipping details are entered and the order is dispatched 4. Customer is mailed tracking information 5. Status updated to “ Order Complete”
Entry Conditions	• User is logged into the system • Job status is “Shipping
Exit Conditions	• Status updated as “Order Complete”
Exception	• No exceptions

Use case Name	Search
Participating Actors	Administrator Customer
Flow of Events	1. User enters search term, and target database to examine. 2. System returns a list of all matches to the search term.
Entry Conditions	• User is logged in.
Exit Conditions	• None
Exception	• No Exceptions

3.4.3 Object Model

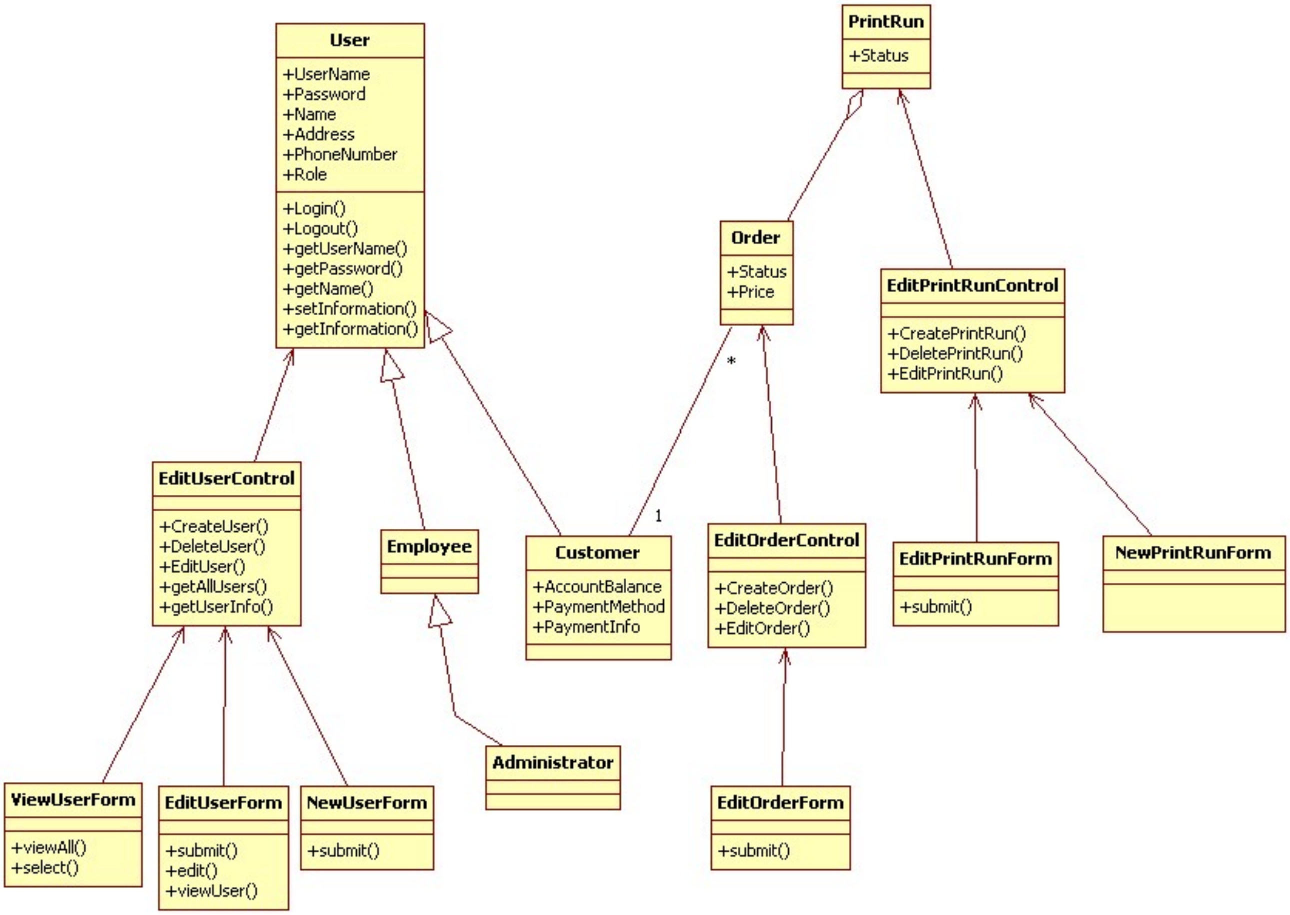

Figure 2 – Object Diagram for PWAS

3.4.4 Dynamic Model

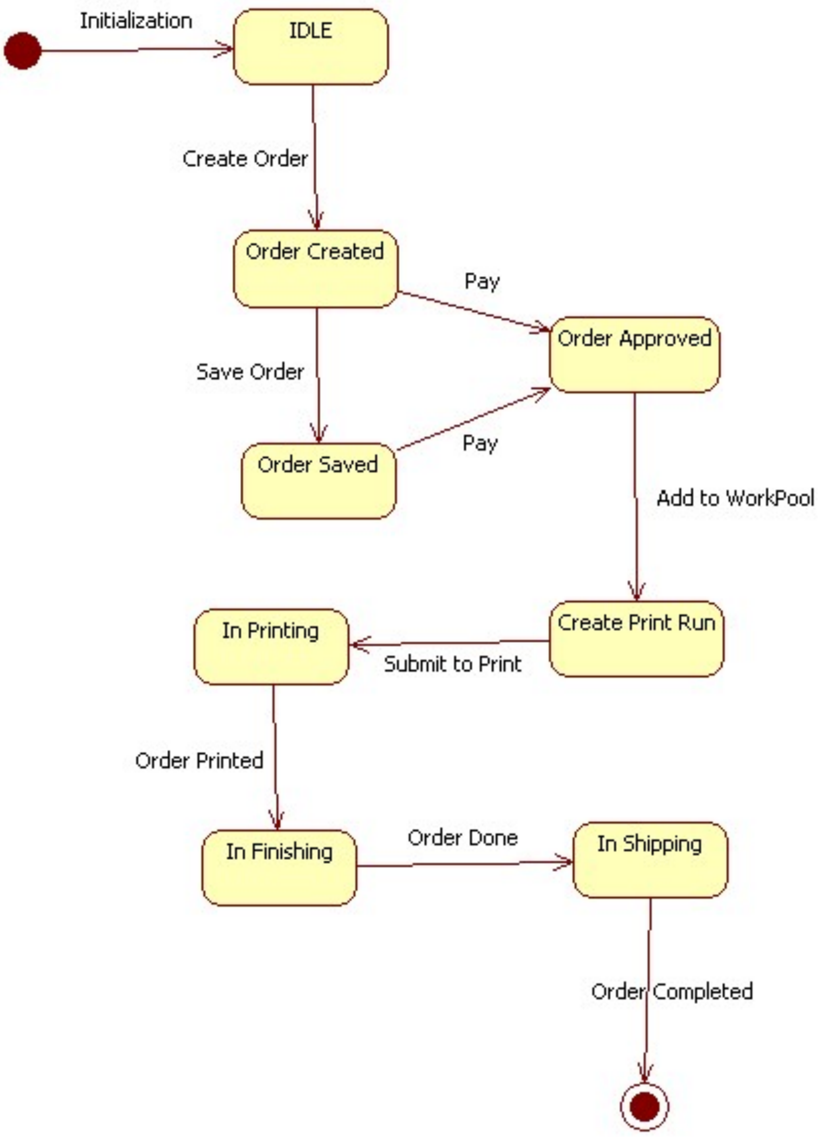

Figure 3 – Statechart Diagram for PWAS

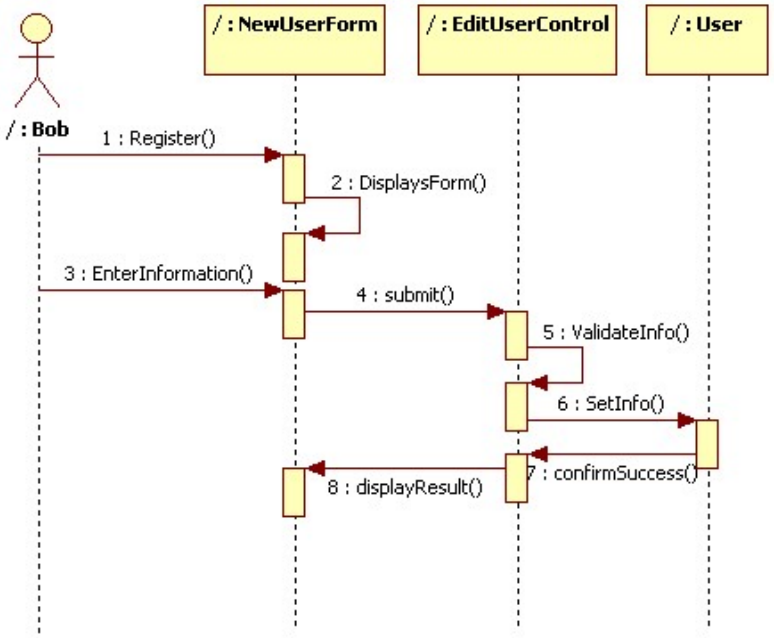

Figure 4 – Sequence Diagram for the "Register" functionality

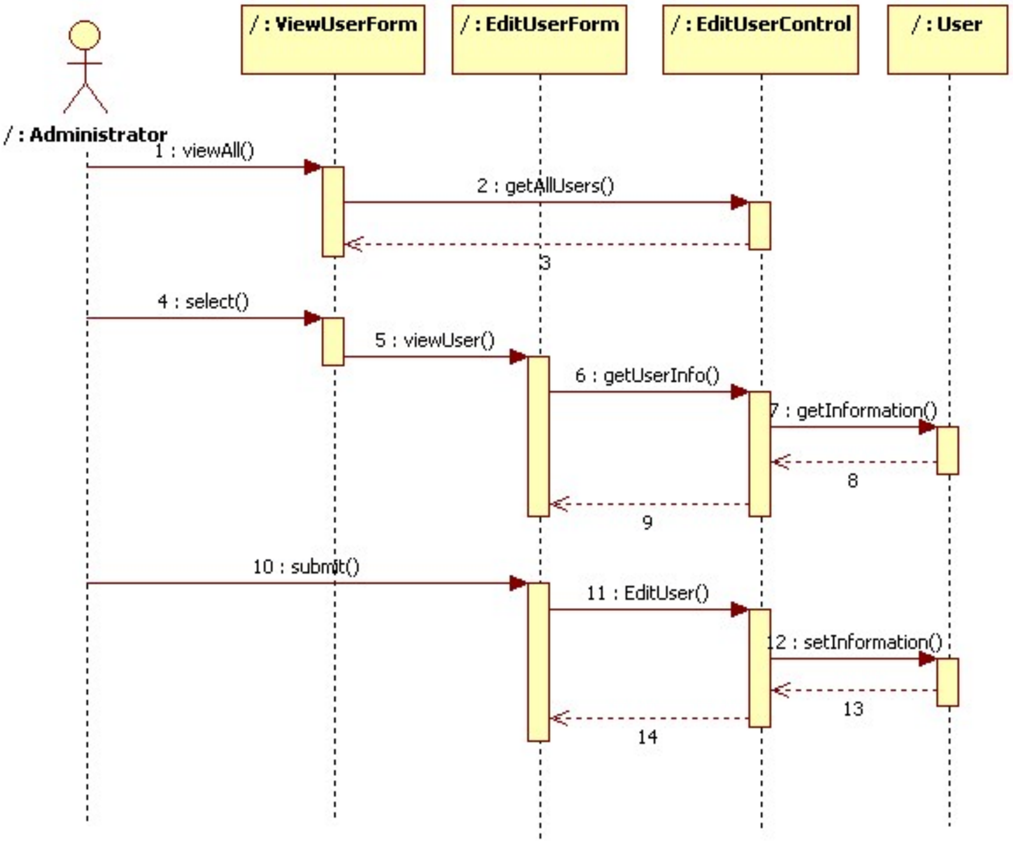

Figure 5 – Sequence Diagram for the "Edit User" functionality

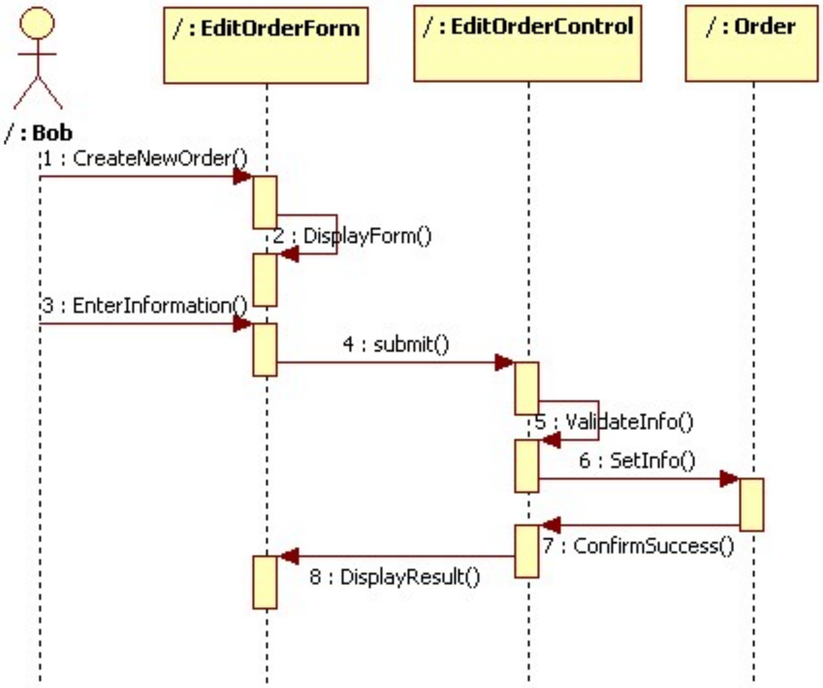

Figure 6 – Sequence Diagram for the "Create New Order" functionality

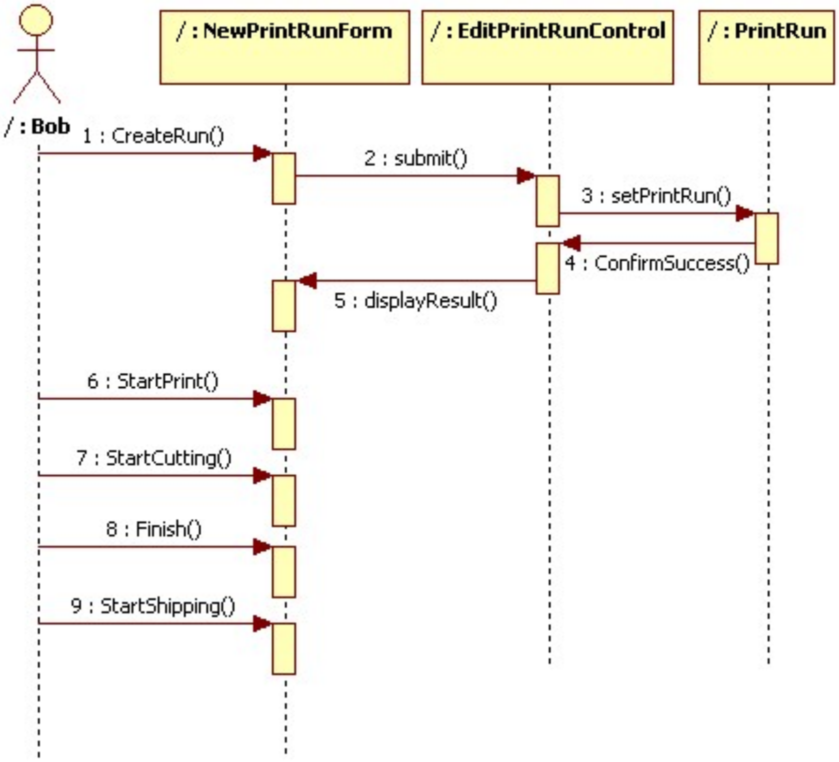

Figure 7 – Sequence Diagram for the "Create Print Run" functionality

3.4.5 User Interface

4. Glossary

- **Administrator**: A member of the company, who has all the rights of a regular Employee plus other administrative rights such as deleting a user, editing a user's information, etc.
- **Employee**: A member of the company, who has all the rights of any User plus other rights such as process customer orders, create print runs, etc.
- **Order**: A User can create an order and save it into the system, which contains specifications regarding printing details, a file to be printed, and payment information.
- **Portal**: Web-based interface presented to customer and employees.
- **Print Run**: A single file created by an employee, which is sent to printing.
- **System**: PWAS is considered the system, and it entails all the software that takes care of the workflow management.
- **User**: A client of the company, who can submit orders for printing, pay those orders, and track the orders as well.