System Design Document:
Car Rental Service

Group 4
CSCI 4050: Software Engineering
Instructor: Krys Kochut
Osama Mansour, Stephen Patton, Vincent Lee, and Minh Pham

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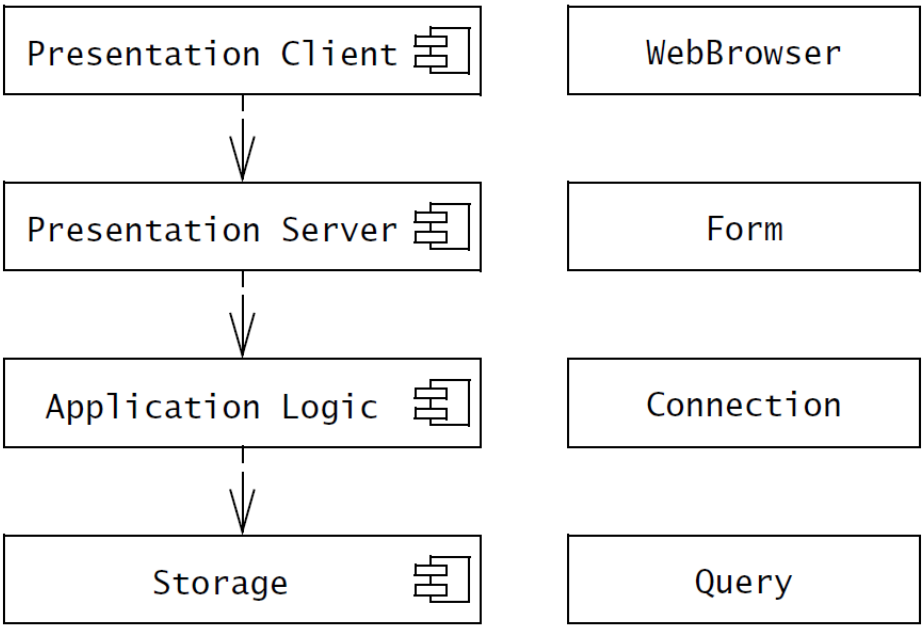
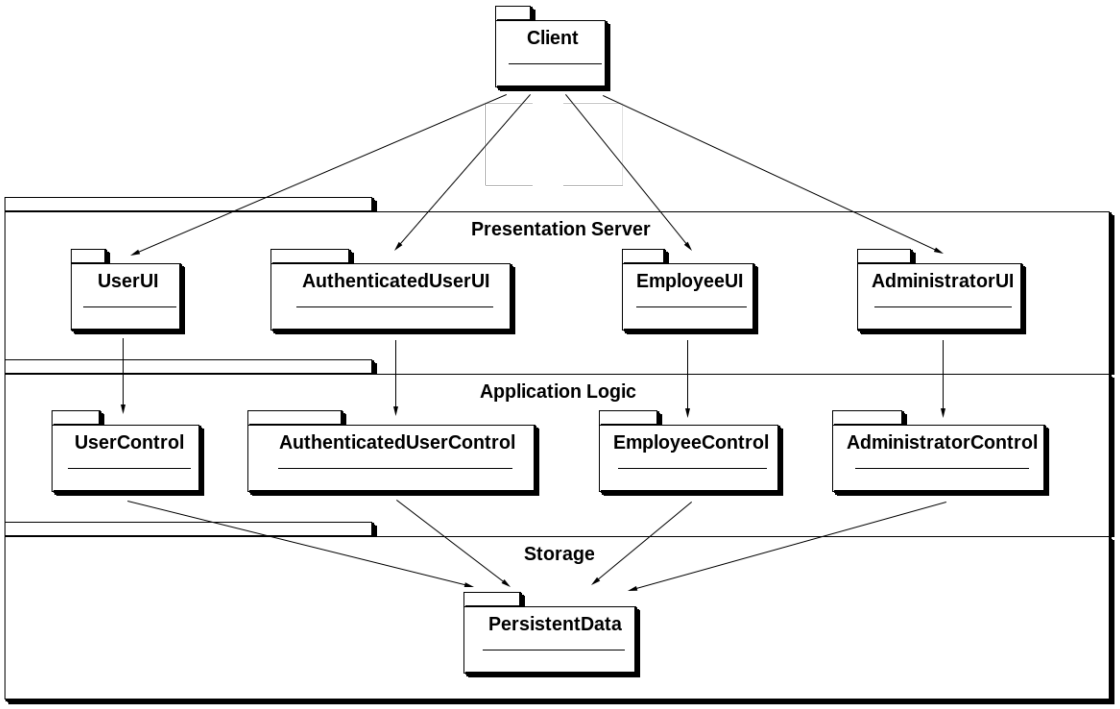
2. Proposed software architecture

2.1 Overview

The car rental service, You Drive, consists of a four-tier architectural style. This style consists of the presentation client, presentation server, application logic, and storage layers. The presentation client layer is located on the user's machines, while the presentation server layer is located on a cluster of servers. The application logic layer includes all control and entity objects, and the storage layer realizes the storage, retrieval, and query of persistent objects.



2.2 Subsystem decomposition



2.2.1 Presentation Layer – UserUI Subsystem

Operation	Returns	Arguments(s)	Description
logIn		username password	Verifies the user identity and log the user in or display message.
register		username password socialSecurityNumber	Registers a AuthenticatedUser with the given

		firstName lastName address telephone creditCard	credentials and information or displays an error message.
locationSearch	List<Location>	keyword	Searches the available locations in the system.
vehicleSearch	List<Vehicle>	keyword	Searches the vehicles in the system.

2.2.2 Presentation Layer – AuthenticatedUserUI Subsystem

Operation	Returns	Arguments(s)	Description
logout			Log the user out.
ViewMyInfo	Customer		Displays all personal information of the current logged in Customer.
ViewAvailbileCars	List<Vehicle>	carName carLocation	Displays the Cars available for rental by location.
ViewMyRentalHistory	List<RentalHistory>		Displays a current logged Customer rental history.
ViewMyBillingInfo	Customer		Displays Current logged Customer billing report.
ViewMyCarRental	CarRental		Displays Customer past and present car rentals.
EditMyInfo	Customer	firstName lastName address telephoneNumber	Allows Customers to edit their information as needed.

2.2.3 Presentation Layer – EmployeeUI Subsystem

Operation	Returns	Arguments(s)	Description
logout			Log the user out.
ViewMyInfo	Employee		Displays all personal information of the current logged in employee.
ViewVehicles	List<Vehicle>	carName carLocation	Displays the Cars available within the Car rental system.
ViewRentalHistory	List<RentalHistory>	customerName	Displays a rental

			history for all customer by name.
ViewBillingHistory	Customer	customerName	Displays all Customer History Billing reports.
ViewCarRentals	List<RentalHistory>	customerName	Displays All Customer Car rental reports.
EditVehicleInfo	Vehicle	vehicleName	Edit Vehicle Information.
EditCustomerInfo	Customer	firstName lastName socialSecurityNumber	Allows Employee to edit customer information as long as they have the following information.

2.2.4 Presentation Layer – AdministratorUI Subsystem

Operation	Returns	Arguments(s)	Description
logout			Log the user out.
ViewMyInfo	Administrator		Displays all personal information of the current logged in employee.
ViewVehicles	List<Vehicle>	carName carLocation	Displays the Cars available within the Car rental system.
ViewRentalHistory	List<RentalHistory>	customerName	Displays a rental history for all customer by name.
ViewBillingHistory	List<BillingHistory>	customerName	Displays all Customer History Billing reports.
ViewCarRentals	List<CarRental>	customerName	Displays All Customer Car rental reports.
EditVehicleInfo	Vehicle	make model tag mileage last_serviced condition	Edit Vehicle Information.
EditCustomerInfo	Customer	socialSecurityNumber firstName lastName address telephone	Allows Admin to edit customer information both adding and removing Customers.
EditEmployeeInfo	Employee	firstName lastName address telephone	Allows Admin to edit Employee information within the system both adding and removing

			employees.

2.2.5 Application Logic Layer – UserControl Subsystem

Operation	Returns	Arguments(s)	Description
logIn	boolean	username password	Verifies the user identity and log the user in or display message.
register	boolean	username password socialSecurityNumber firstName lastName address telephone creditCard driverLicense	Registers an AuthenticatedUser with the given credentials and information or displays an error message.
locationSearch	List<Location>	keyword	Searches the available locations in the system.
vehicleSearch	List<Vehicle>	keyword	Searches the vehicles in the system.

2.2.6 Application Logic Layer – AuthenticatedUserControl Subsystem

Operation	Returns	Arguments(s)	Description
logOut			Log the user out.
GetMyInfo	Customer		Returns customer personal information of the current logged in Customer.
GetAvailbileCars	List<Vehicle>	carName carLocation	Returns the Cars available for rental by location.
GetMyRentalHistory	List<RentalHistory>		Returns a current logged Customer rental history.
GetMyBillingInfo	Customer		Returns Current logged Customer billing report.
GetMyCarRental	CarRental		Returns Customer past and present car rentals.
GetMyInfo	Customer	firstName lastName address telephoneNumber	Returns Customer information.

2.2.7 Application Logic Layer – EmployeeControl Subsystem

Operation	Returns	Arguments(s)	Description
logOut			Log the user out.
GetMyInfo	Employee		Returns all personal information of the current logged in employee.
GetVehicles	List<Vehicle>	carName carLocation	Returns the Cars available within the Car rental system.
GetRentalHistory	List<RentalHistory>	customerName	Returns a rental history for all customer by name.
GetBillingHistory	Customer	customerName	Returns all Customer History Billing reports.
GetCarRentals	List<RentalHistory>	customerName	Returns All Customer Car rental reports.
GetVehicleInfo	Vehicle	vehicleName	Returns Vehicle Information.
GetCustomerInfo	Customer	firstName lastName socialSecurityNumber	Returns Customer information verified by customer information.

2.2.8 Application Logic Layer – AdministratorControl Subsystem

Operation	Returns	Arguments(s)	Description
logOut			Log the user out.
GetMyInfo	Administrator		Returns all personal information of the current logged in employee.
GetVehicles	List<Vehicle>	carName carLocation	Returns the Cars available within the Car rental system.
GetRentalHistory	List<RentalHistory>	customerName	Returns a rental history for all customer by name.
GetBillingHistory	List<BillingHistory>	customerName	Returns all Customer History Billing reports.
GetCarRentals	List<CarRental>	customerName	Returns All Customer Car rental reports.
GetVehicleInfo	Vehicle	make model tag mileage last_serviced	Return Vehicle Information.

		condition	
GetCustomerInfo	Customer	socialSecurityNumber firstName lastName address telephone	Returns customer information for editing.
GetEmployeeInfo	Employee	firstName lastName address telephone	Returns Employee information within the system for both adding and removing employees.

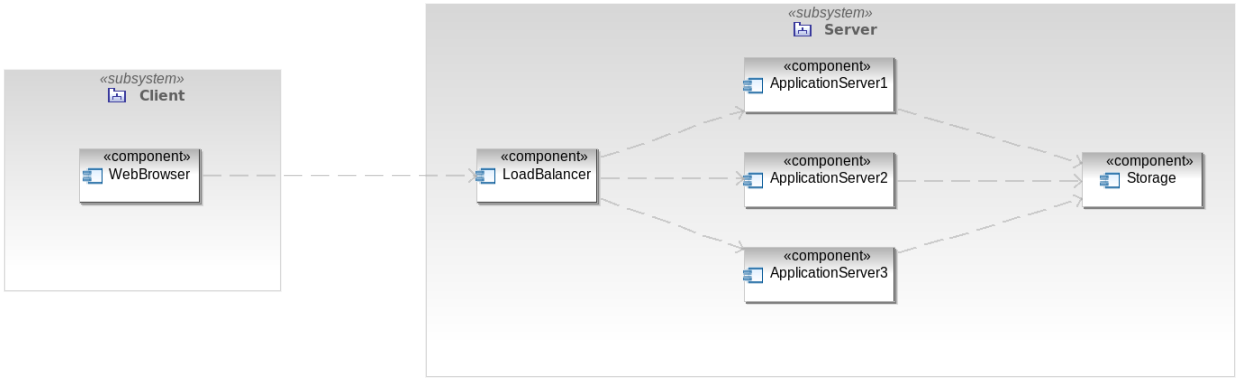
2.3 Hardware/software mapping

The four-tier architectural style is realized in hardware as two subsystems: Client and the Server. The Client subsystem contains the Presentation Client while the Server subsystem contains the Presentation Server, Application Logic, and Storage. An additional component, the Load Balancer distributes network traffic across a number of servers in the subsystem. In overview, the Client connects with a Load Balancer which routes the user's request to one of the three Application Server's which then communicates with the centralized storage to finish processing the request.

The presentation client is a web browser which is a software application for retrieving, presenting and traversing information resources from the server subsystem. The web browser also is capable of executing JavaScript (JS) which is a client scripting language that communicate asynchronously, and can alter the document content that is displayed in the web browser.

The presentation server and application logic layers reside on one of the three Application Server's. The interface is realized with HTML styled with CSS. The HTML is wrapped in JavaServer Pages (JSP) which allows dynamically generated web page creation. The JSP pages use the Java programming language, which is deployed on a servlet container Tomcat. Inside the Tomcat server, are JavaBean's which contain the application logic or connection required to communicate with the storage system.

The storage system consists of a MySQL Server relational database management system (RDBMS). This persistent storage is accessed by one of the three application servers providing abstraction from the system ensuring security, and data integrity.



3. Subsystem services