Use Case diagram

What is a use case diagram?

- In the Unified Modeling Language (UML), a use case diagram can summarize the details of your system's users (also known as actors) and their interactions with the system. To build one, you'll use a set of specialized symbols and connectors.

Usefulness

Represents-

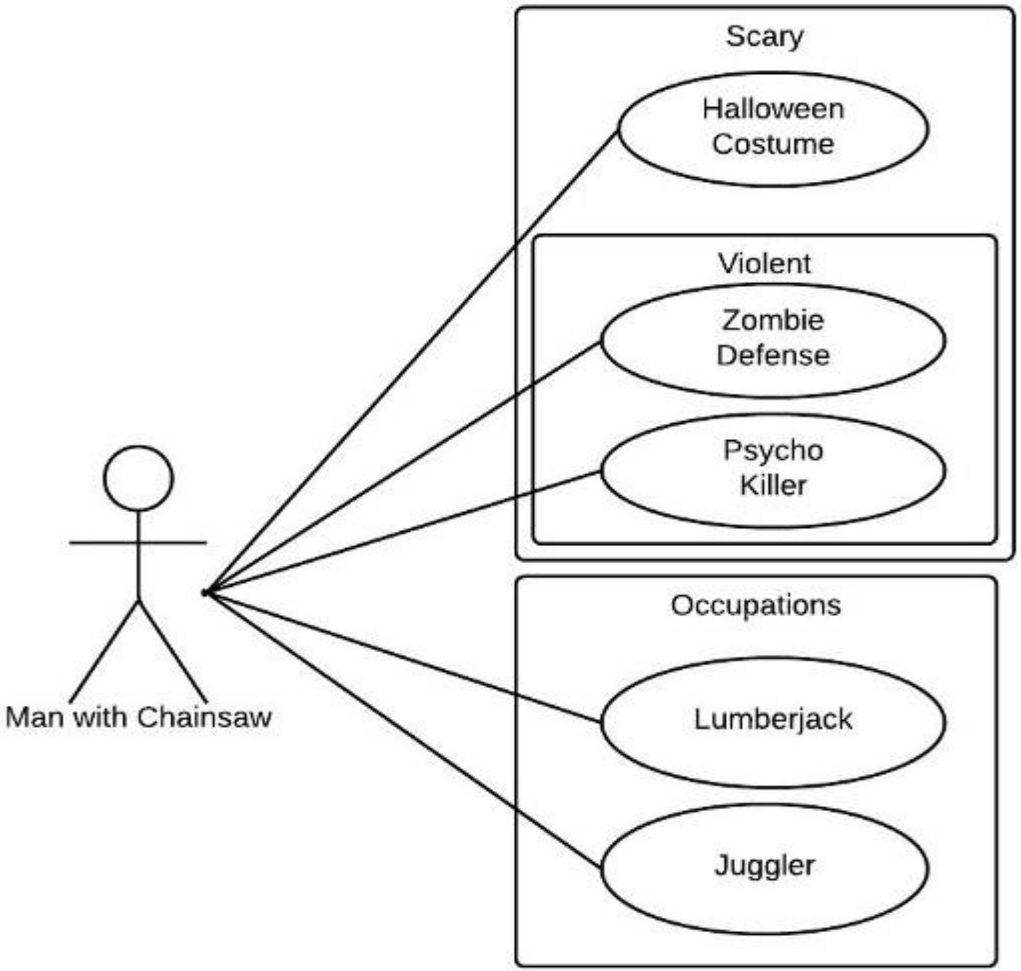
- Scenarios in which your system or application interacts with people, organizations, or external systems
- Goals that your system or application helps those entities (known as actors) achieve
- The scope of your system

Use case diagram components

- **Actors:** The users that interact with a system. An actor can be a person, an organization, or an outside system that interacts with your application or system. They must be external objects that produce or consume data.

- **System:** A specific sequence of actions and interactions between actors and the system. A system may also be referred to as a scenario.

- **Goals:** The end result of most use cases. A successful diagram should describe the activities and variants used to reach the goal.


Scary
Halloween Costume
Violent
Zombie Defense
Psycho Killer
Occupations
Lumberjack
Juggler
Man with Chainsaw

Basic Use Case Diagram Symbols and Notations

- **System**
  Draw your system's boundaries using a rectangle that contains use cases. Place actors outside the system's boundaries.

System

- **Use Case**
  Draw use cases using ovals. Label the ovals with verbs that represent the system's functions.

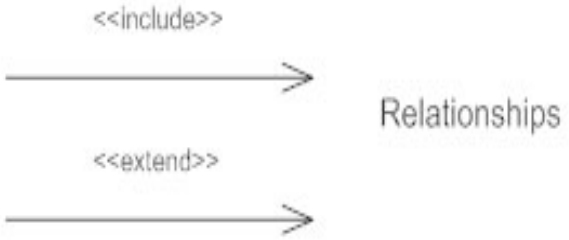
Use case

Basic Use Case Diagram Symbols and Notations

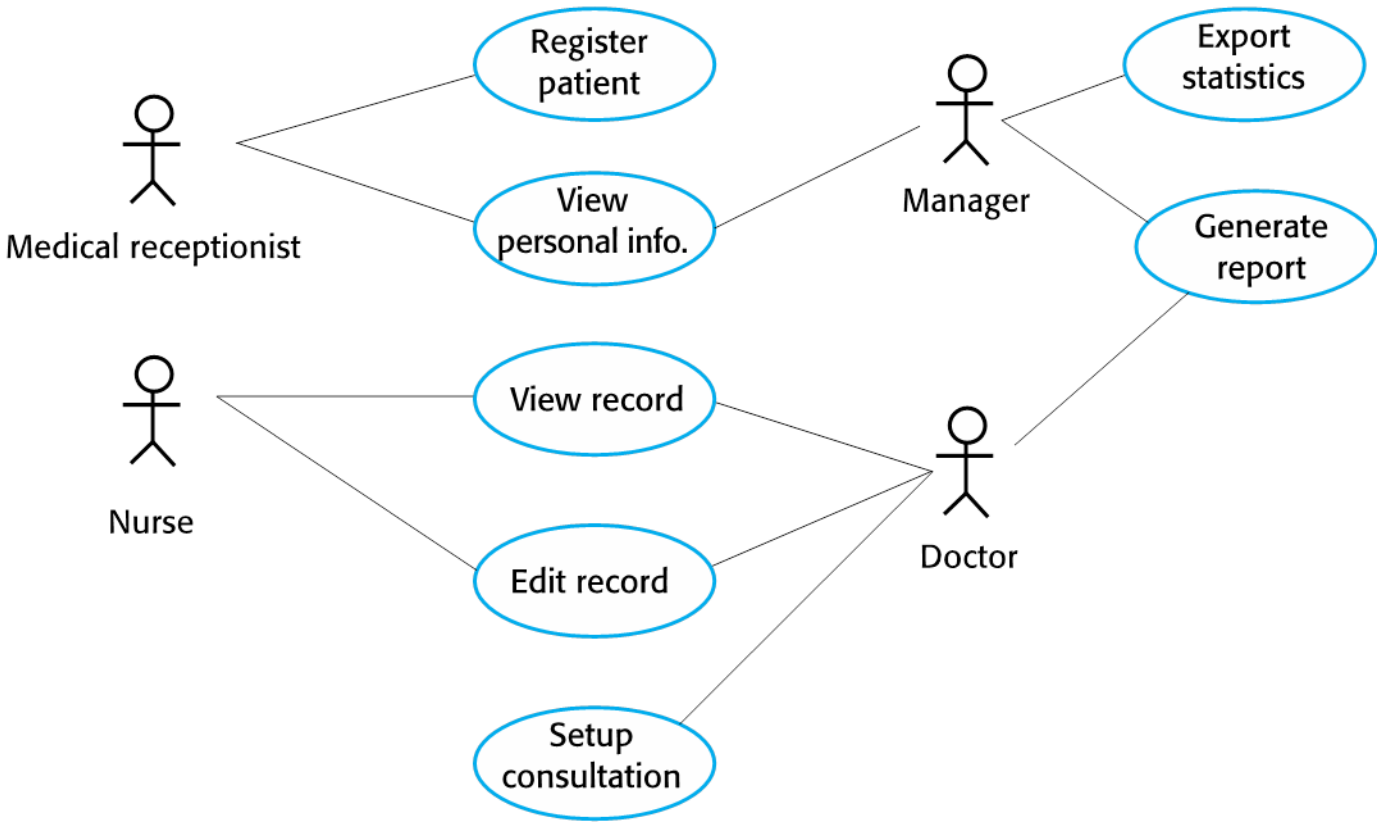
- **Actors**
  Actors are the users of a system. When one system is the actor of another system, label the actor system with the actor stereotype**.**

Relationships

Illustrate relationships between an actor and a use case with a simple line. For relationships among use cases, use arrows labeled either "uses" or "extends." A "uses" relationship indicates that one use case is needed by another in order to perform a task. An "extends" relationship indicates alternative options under a certain use case.

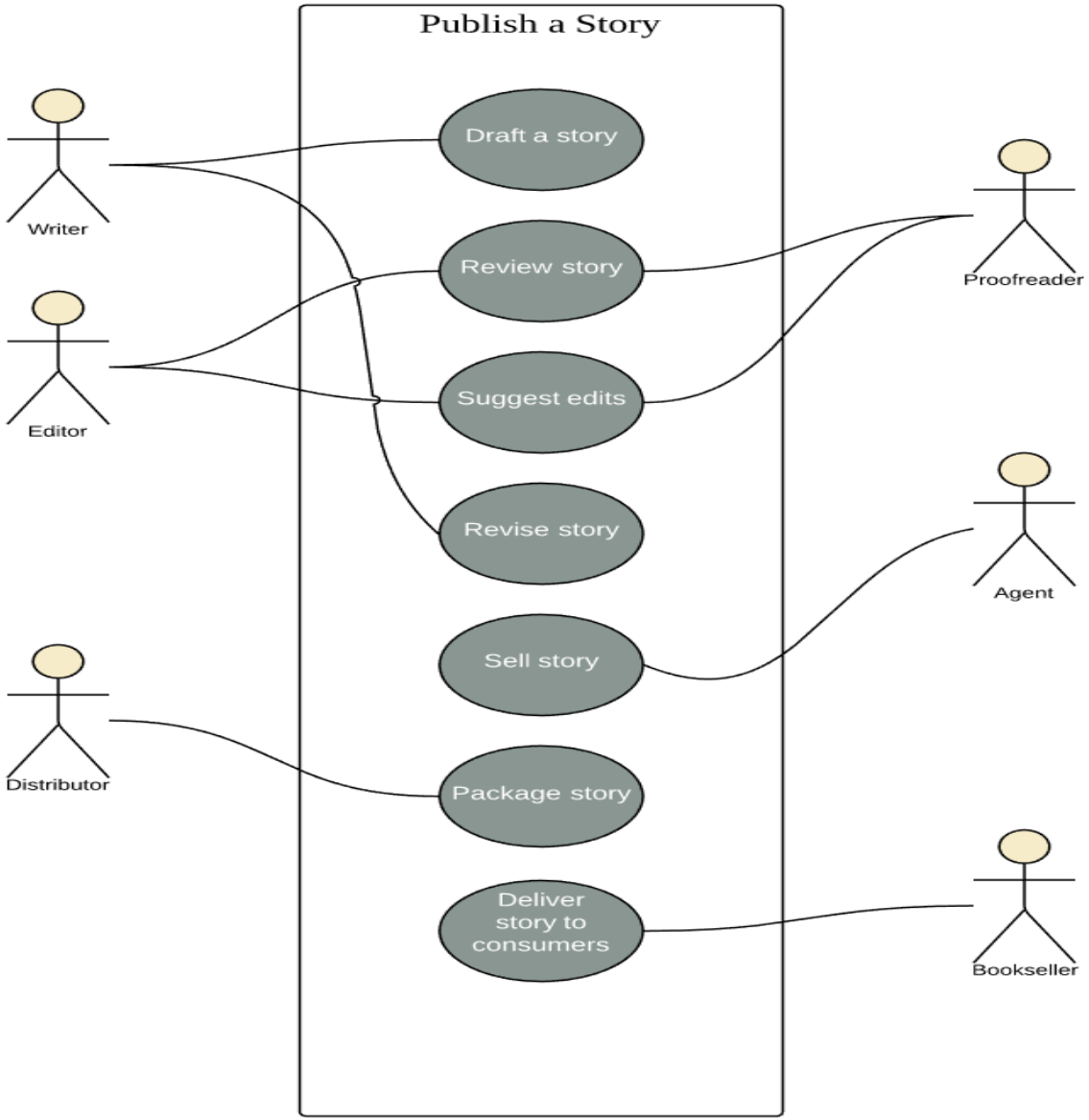


Use cases for the Mentcare system

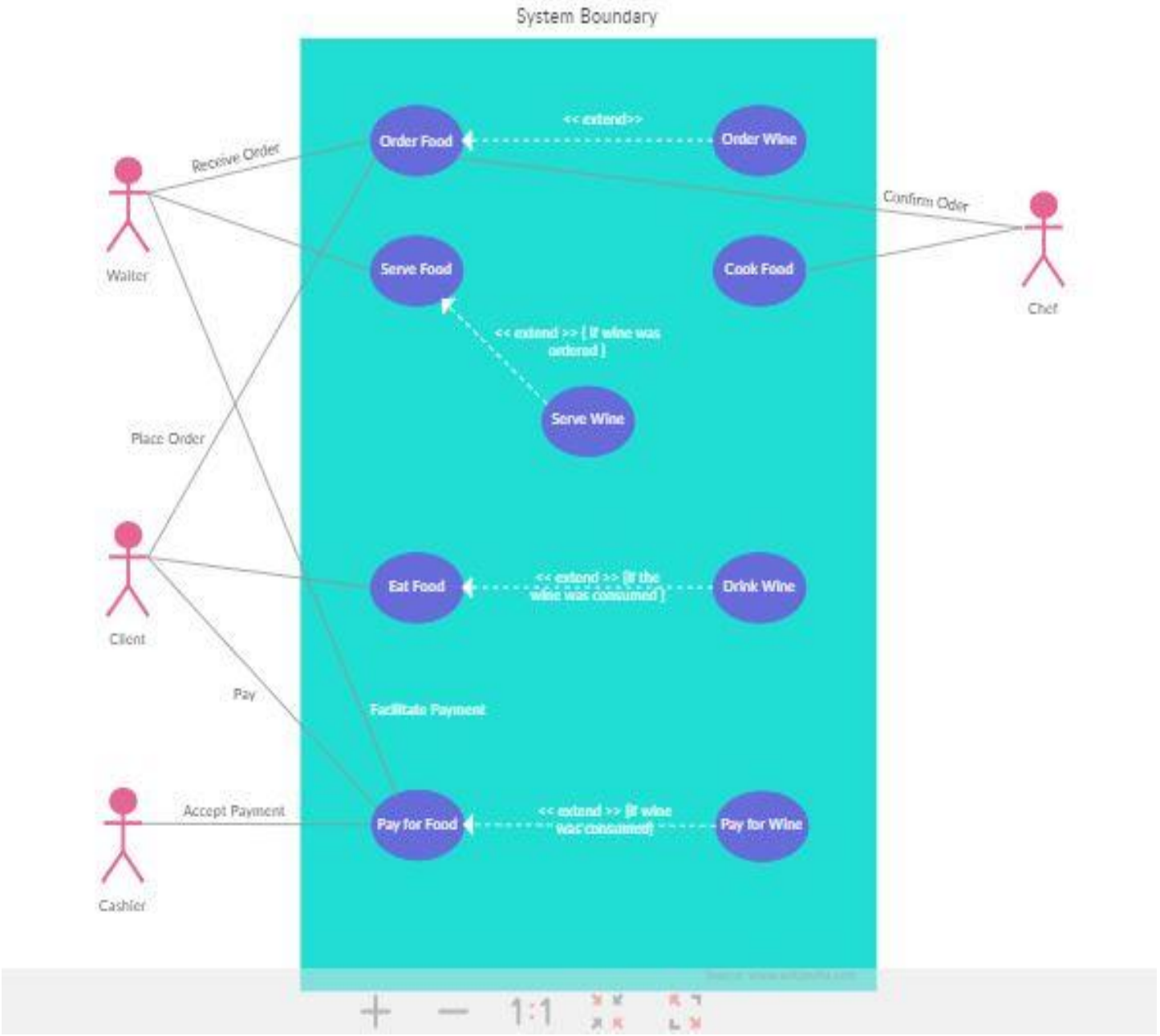


Book publishing use case diagram example

This use case diagram is a visual representation of the process required to write and publish a book. Whether you're an author, an agent, or a bookseller, inserting this diagram into your use case scenario can help your team publish the next big hit



Use Case Diagram Template of Restaurant Order System.



UML Use Case Diagram

A use case diagram is used to represent the dynamic behavior of a system. It encapsulates the system's functionality by incorporating use cases, actors, and their relationships. It models the tasks, services, and functions required by a system/subsystem of an application. It depicts the high-level functionality of a system and also tells how the user handles a system.

Purpose of Use Case Diagrams

The main purpose of a use case diagram is to portray the dynamic aspect of a system. It accumulates the system's requirement, which includes both internal as well as external influences. It invokes persons, use cases, and several things that invoke the actors and elements accountable for the implementation of use case diagrams. It represents how an entity from the external environment can interact with a part of the system.

Following are the purposes of a use case diagram given below:

1. It gathers the system's needs.
2. It depicts the external view of the system.
3. It recognizes the internal as well as external factors that influence the system.
4. It represents the interaction between the actors.

How to draw a Use Case diagram?

It is essential to analyze the whole system before starting with drawing a use case diagram, and then the system's functionalities are found. And once every single functionality is identified, they are then transformed into the use cases to be used in the use case diagram.

After that, we will enlist the actors that will interact with the system. The actors are the person or a thing that invokes the functionality of a system. It may be a system or a private entity, such that it requires an entity to be pertinent to the functionalities of the system to which it is going to interact.

Once both the actors and use cases are enlisted, the relation between the actor and use case/ system is inspected. It identifies the no of times an actor communicates with the system. Basically, an actor can interact multiple times with a use case or system at a particular instance of time.

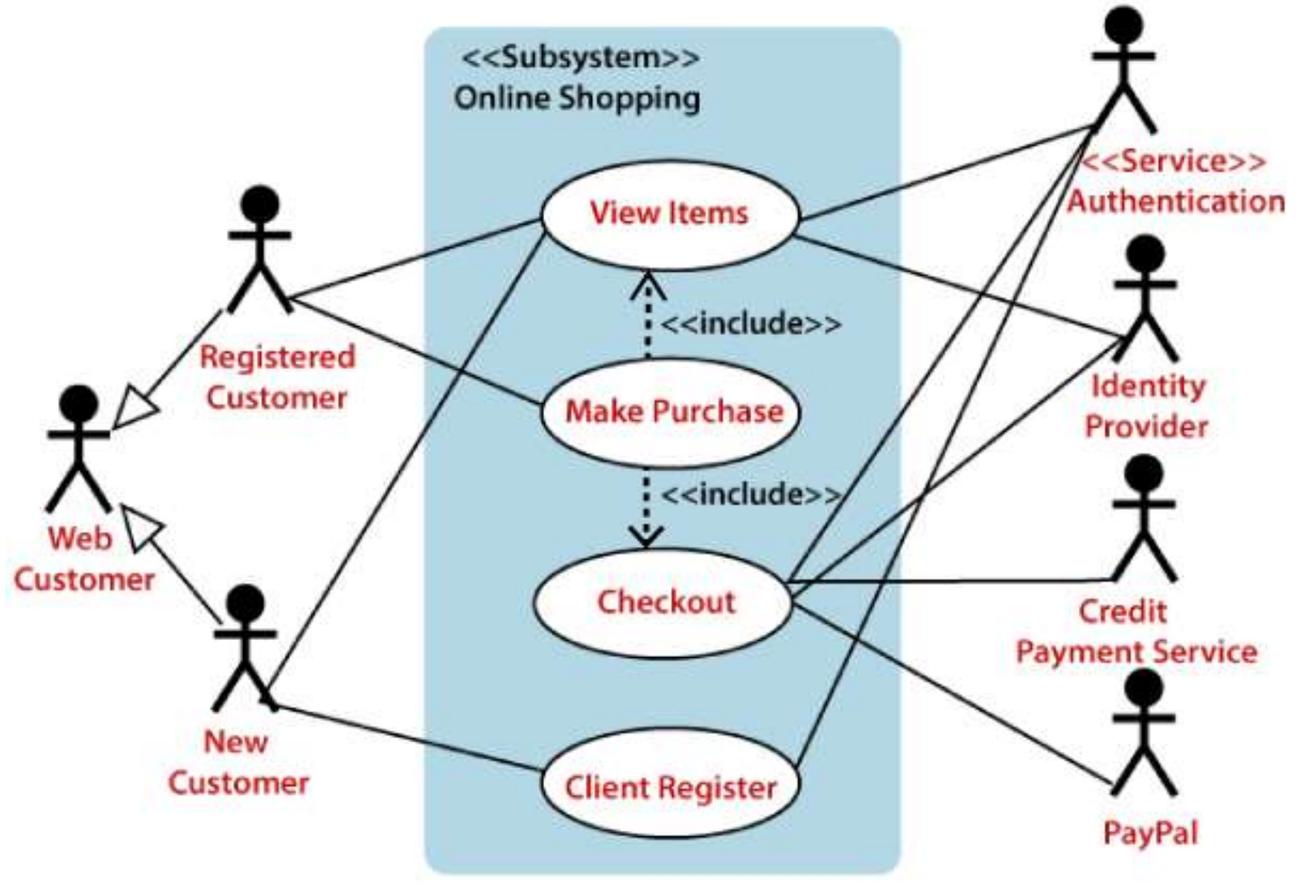
Following are some rules that must be followed while drawing a use case diagram:

1. A pertinent and meaningful name should be assigned to the actor or a use case of a system.
2. The communication of an actor with a use case must be defined in an understandable way.
3. Specified notations to be used as and when required.
4. The most significant interactions should be represented among the multiple no of interactions between the use case and actors.

Example of a Use Case Diagram

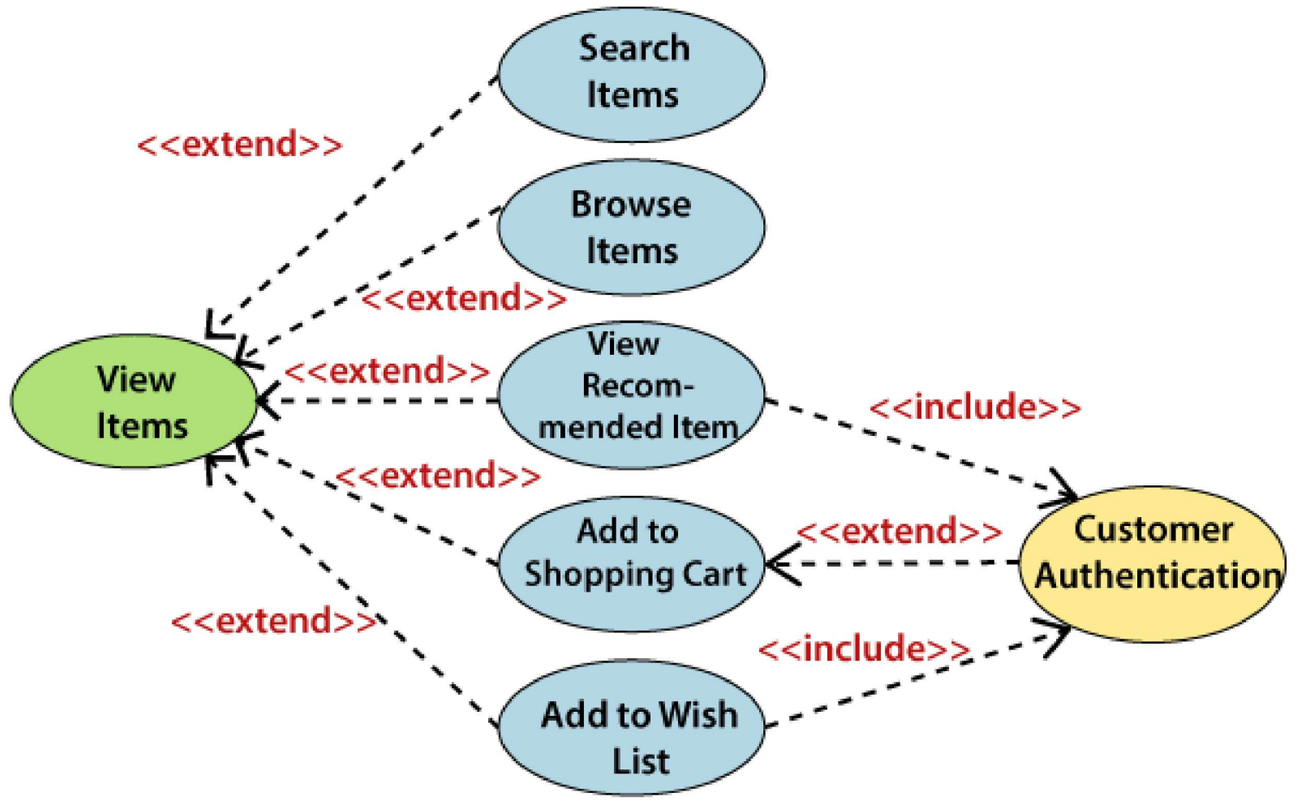
A use case diagram depicting the Online Shopping website is given below.

Here the Web Customer actor makes use of any online shopping website to purchase online. The top-level uses are as follows; View Items, Make Purchase, Checkout, Client Register. The **View Items** use case is utilized by the customer who searches and view products. The **Client Register** use case allows the customer to register itself with the website for availing gift vouchers, coupons, or getting a private sale invitation. It is to be noted that the **Checkout** is an included use case, which is part of **Making Purchase,** and it is not available by itself.



The **View Items** is further extended by several use cases such as; Search Items, Browse Items, View Recommended Items, Add to Shopping Cart, Add to Wish list. All of these extended use cases provide some functions to customers, which allows them to search for an item. The View Items is further extended by several use cases such as; Search Items, Browse Items, View Recommended Items, Add to Shopping Cart, Add to Wish list. All of these extended use cases provide some functions to customers, which allows them to search for an item.

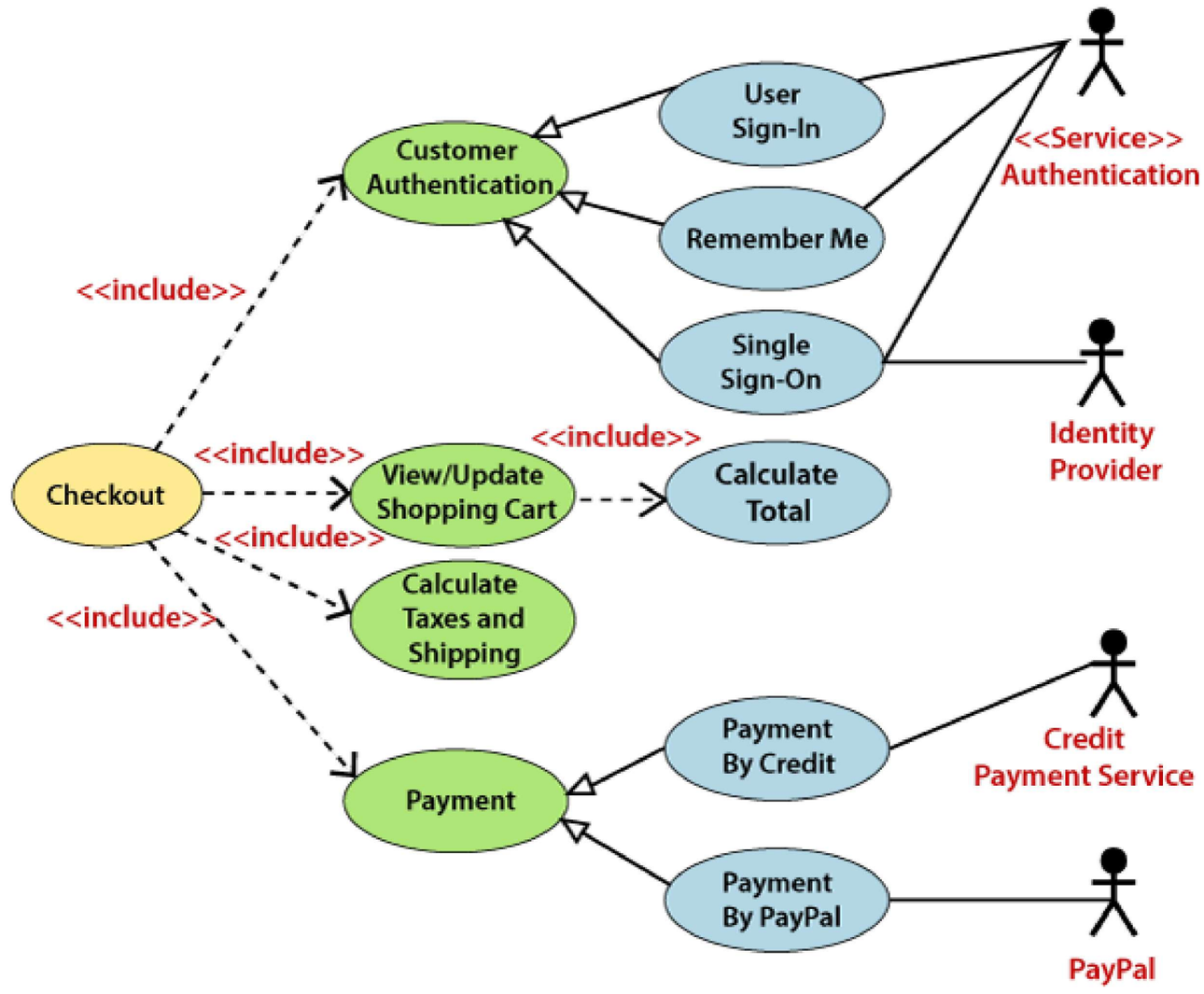
Both **View Recommended Item** and **Add to Wish List** include the Customer Authentication use case, as they necessitate authenticated customers, and simultaneously item can be added to the shopping cart without any user authentication.



Similarly, the **Checkout** use case also includes the following use cases, as shown below. It requires an authenticated Web Customer, which can be done by login page, user authentication cookie ("Remember me"), or Single Sign-On (SSO). SSO needs an external identity

provider's participation, while Web site authentication service is utilized in all these use cases.

The Checkout use case involves Payment use case that can be done either by the credit card and external credit payment services or with PayPal.



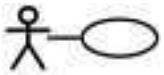
Important tips for drawing a Use Case diagram

Following are some important tips that are to be kept in mind while drawing a use case diagram:

1. A simple and complete use case diagram should be articulated.
2. A use case diagram should represent the most significant interaction among the multiple interactions.
3. At least one module of a system should be represented by the use case diagram.
4. If the use case diagram is large and more complex, then it should be drawn more generalized.

UML Use Case Diagram Examples

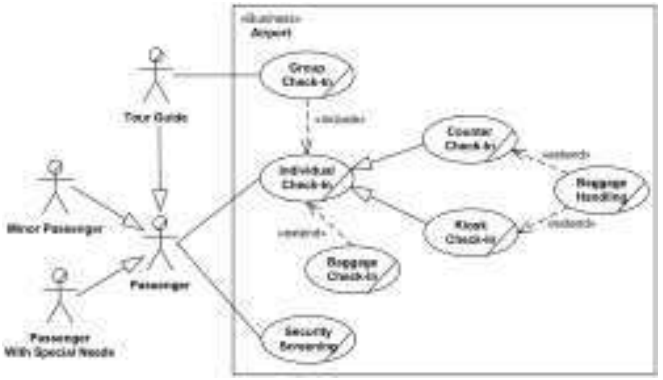
Examples of business use case diagrams



Airport check-in and security screening business model

***Purpose**: An example of a business use case diagram for airport check-in and security screening.*

***Summary**: Business use cases are Individual Check-In, Group Check-In (for groups of tourists), Security Screening, etc. - representing business functions or processes taking place in an airport and serving needs of passengers.*



Airport Check-In and Security Screening

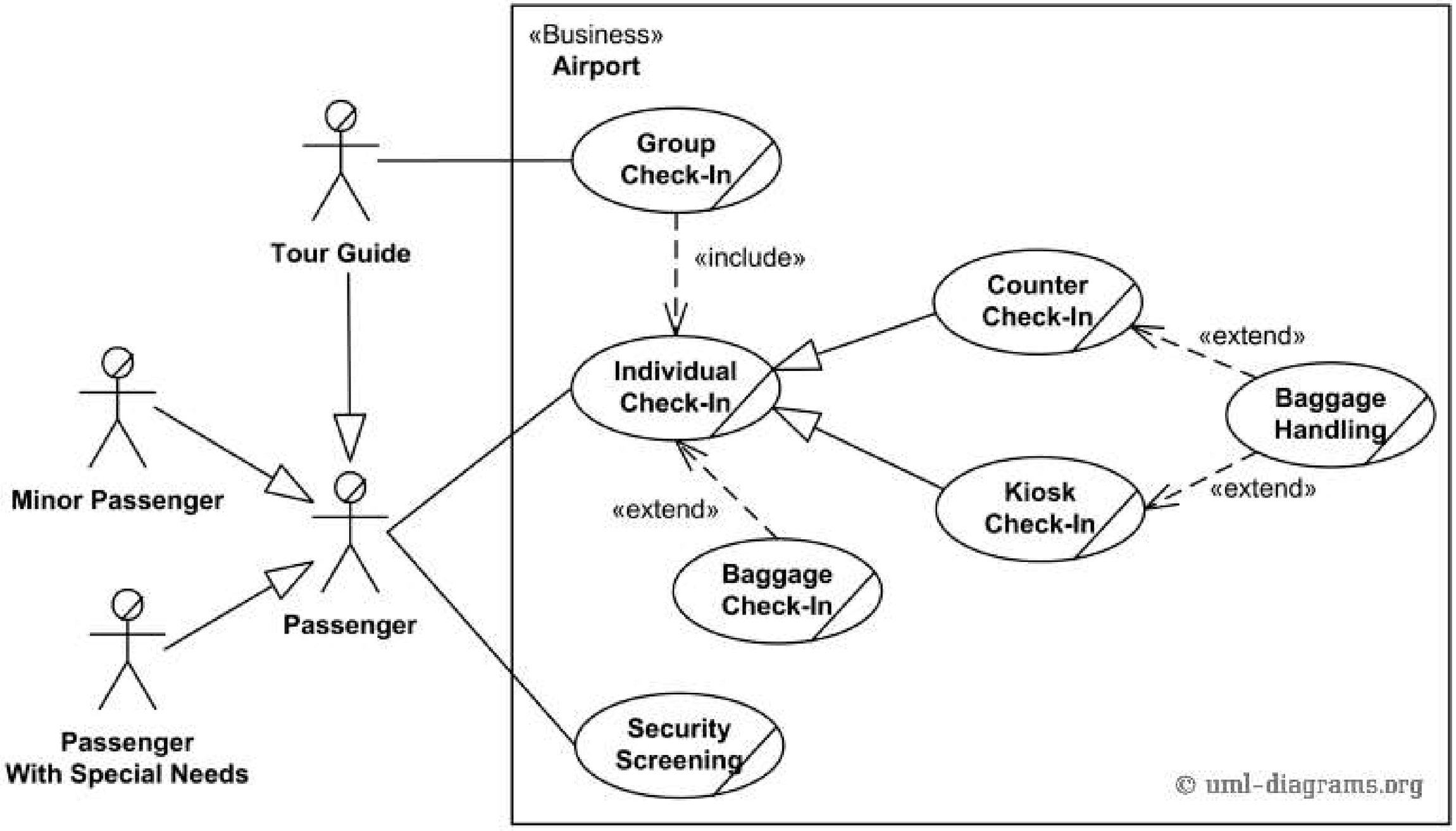
UML Use Case Diagram Example

This is an example of a **business use case** diagram which is usually created during **Business Modeling** and is rendered here in **Rational Unified Process** (RUP) notation.

Business actors are Passenger, Tour Guide, Minor (Child), Passenger with Special Needs (e.g. with disabilities), all playing **external roles** in relation to airport business.

Business use cases are Individual Check-In, Group Check-In (for groups of tourists), Security Screening, etc. - representing business functions or processes taking place in airport and serving the needs of passengers.

Business use cases Baggage Check-in and Baggage Handling extend Check-In use cases, because passenger might have no luggage, so baggage check-in and handling are optional.



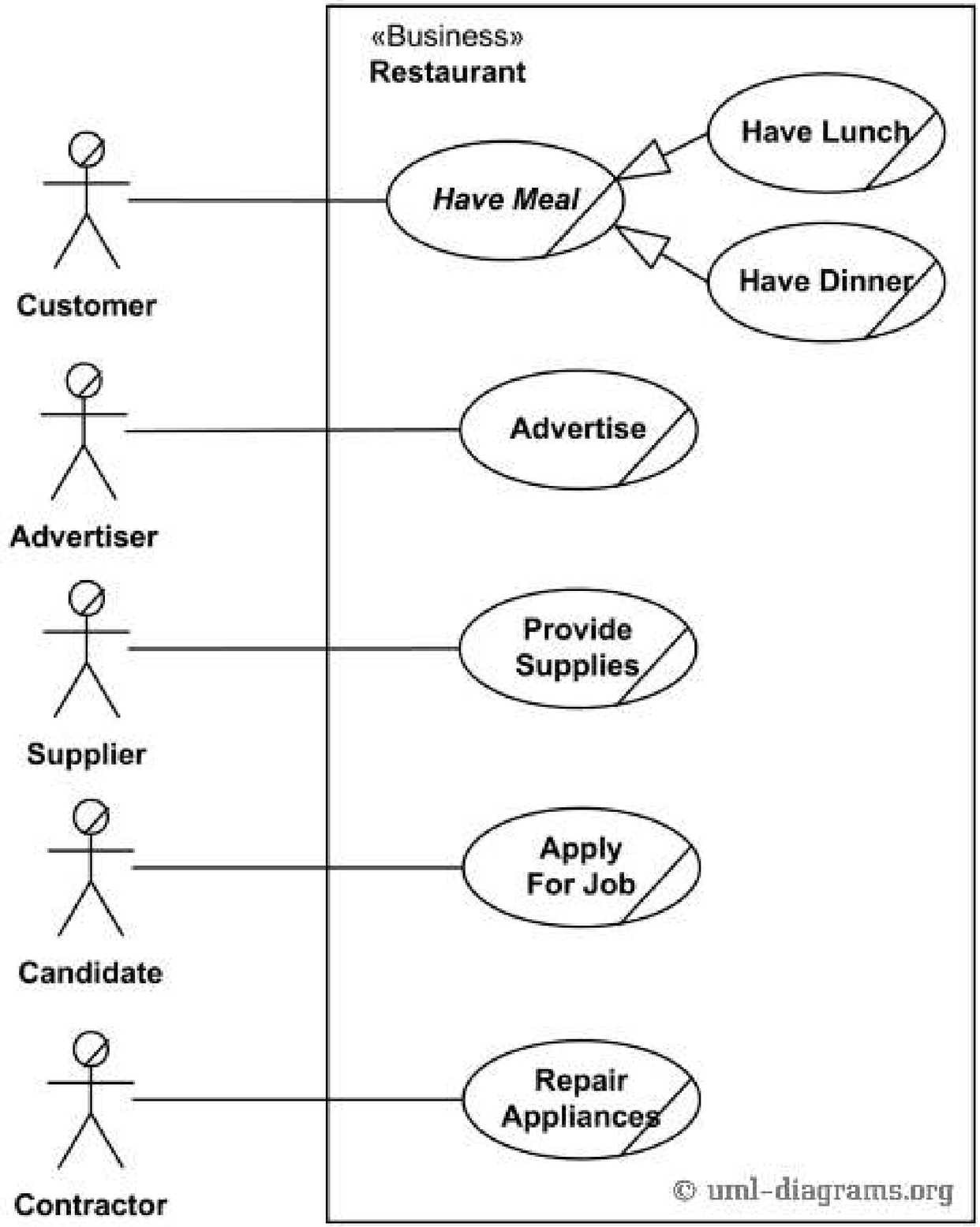
An example of use case diagram for airport check-in and security screening.

Restaurant

UML Use Case Diagram Example

Here we provide two alternative examples of a **business use case** diagram for a Restaurant, rendered in a notation used by **Rational Unified Process** (RUP).

First example shows **external business view** of a restaurant. We can see several **business actors** having some needs and goals as related to the restaurant and **business use cases** expressing expectations of the actors from the business.


«Business»
Restaurant
Have Lunch
Have Meal
Have Dinner
Customer
Advertise
Advertiser
Provide Supplies
Supplier
Apply For Job
Candidate
Repair Appliances
Contractor
© uml-diagrams.org

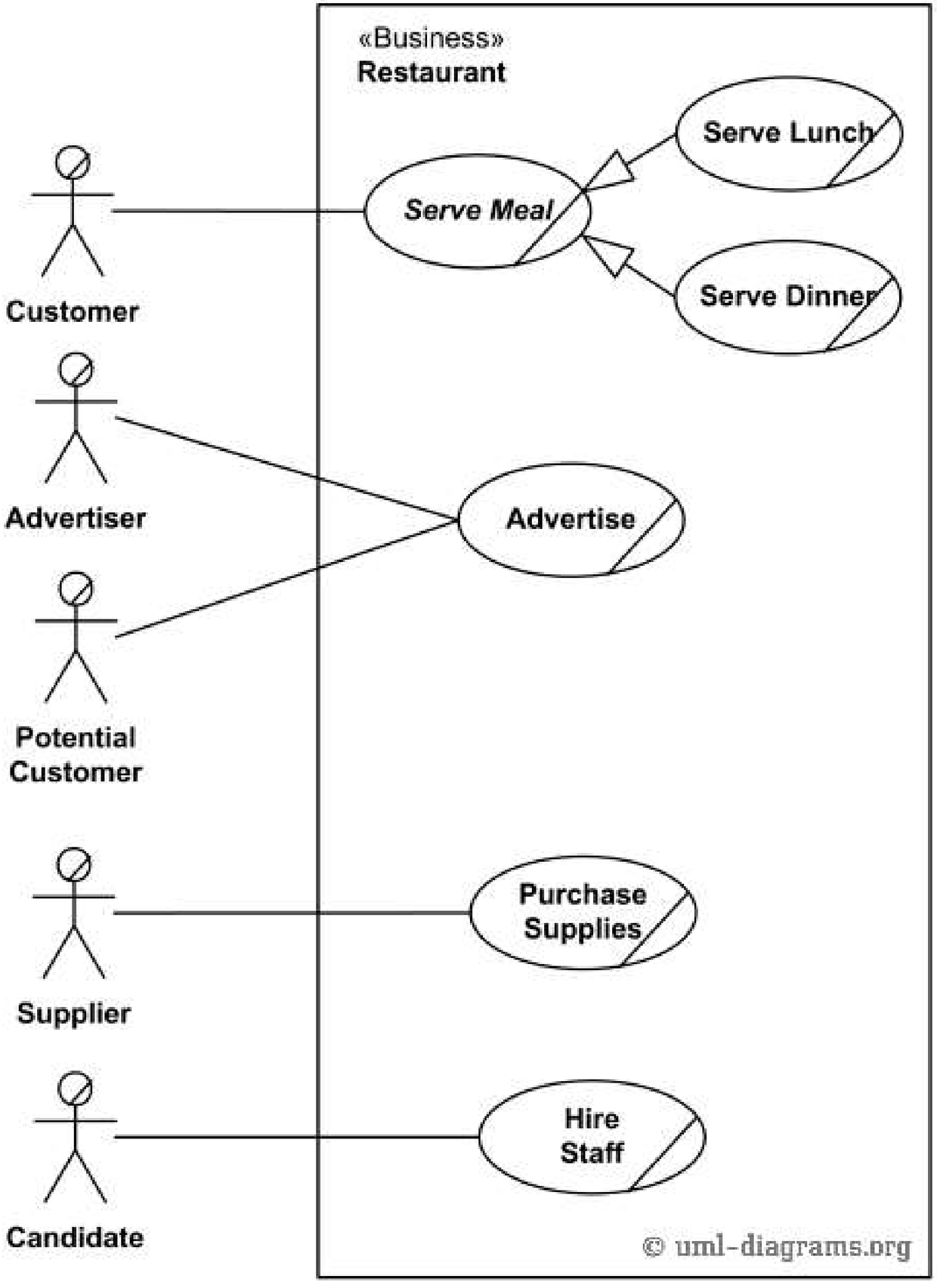
Business use case diagram for Restaurant - External view

For example, **Customer** wants to **Have Meal**, **Candidate** - to **Apply for Job**, and **Contractor** - to fix some appliances. Note, that we don't have such actors as **Chef** or **Waiter**. They are not external roles but part of the business we model - the Restaurant, thus - they are not actors. In terms of RUP Chef and Waiter are **business workers**.

Second example shows **internal business view** of a restaurant. In this case we can see that restaurant has several business processes represented by **business use cases** which provide some services to external **business actors**. As in the previous example, actors have some needs and goals as related to the restaurant.

This approach could be more useful to model services that the business provides to different types of customers, but reading this kind of business use case diagrams could be confusing.

For example, **Customer** is now connected to **Serve Meal** use case, **Supplier** - to **Purchase Supplies**. We have now new actor **Potential Customer** participating in **Advertise** use case by reading ads and getting some information about restaurant. At the same time, **Contractor** actor is gone because **Repair Appliances** is not a service usually provided by restaurants.


«Business»
Restaurant
Serve Lunch
Serve Meal
Serve Dinner
Customer
Advertiser
Advertise
Potential
Customer
Purchase
Supplies
Supplier
Hire
Staff
Candidate
© uml-diagrams.org

Business use case diagram for Restaurant - Internal view

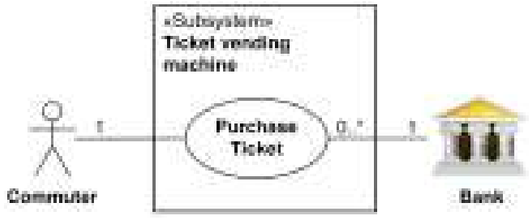
Still, in this example we don't have actors as **Chef** or **Waiter** for the same reasons as before - they both are not external roles but part of the business we model.

Examples of system use case *diagrams*

Ticket vending machine

***Purpose**: Show that ticket vending machine allows commuters to buy tickets.*

***Summary**: The ultimate goal of a Commuter in relation to our ticket vending machine is to buy a ticket. We have a single Purchase Ticket use case, as this vending machine is not providing any other services. Ticket vending machine is a **subject** of the example use case diagram. Commuter and Bank are our **actors**, both participating in the Purchase Ticket **use case**.*



Bank ATM UML use case diagrams examples

***Purpose**: Describe use cases that an automated teller machine (ATM) or the automatic banking machine (ABM) provides to the bank customers.*

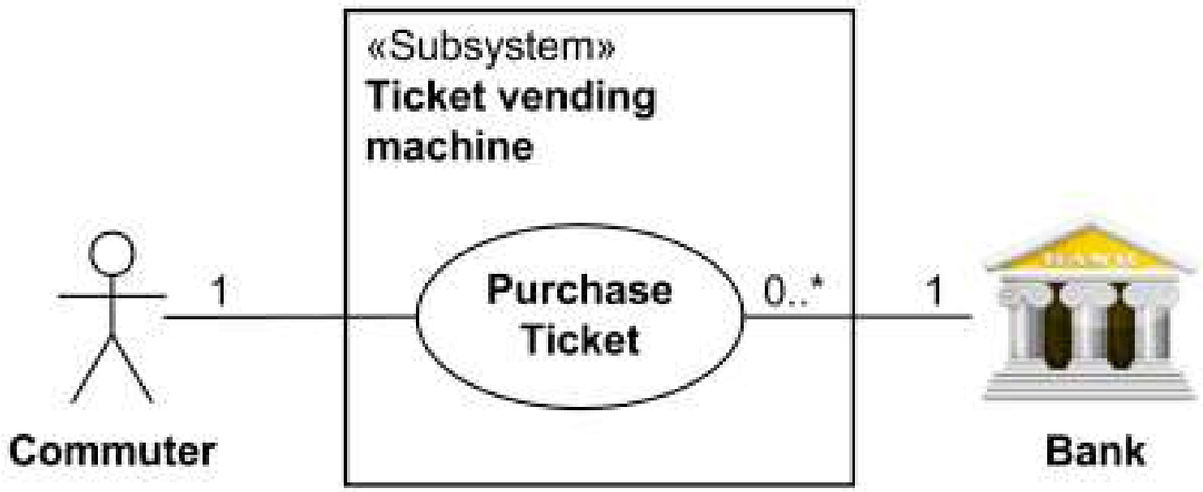
***Summary**: Customer uses a bank ATM to check balances of his/her bank accounts, deposit funds, withdraw cash and/or transfer funds (use cases). ATM Technician provides maintenance and repairs to the ATM.*

Ticket Vending Machine

UML Use Case Diagram Example

Ticket vending machine, i.e. vending machine that sells and produces tickets to commuters, is a **subject** of the example use case diagram. This kind of a machine is a combination of both hardware and software, and it is only a part of the whole system selling tickets to the customers. So we will use **«Subsystem»** stereotype.

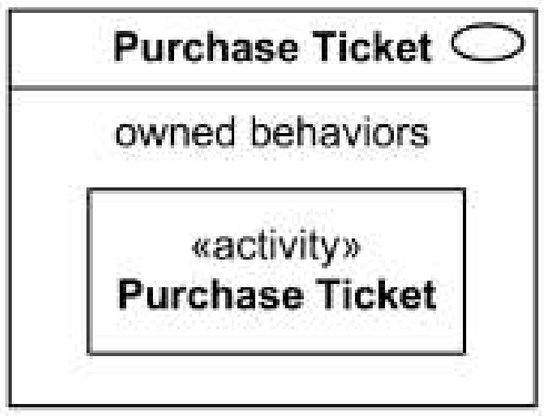
Ticket vending machine allows commuters to buy tickets. So **Commuter** is our primary **actor**.



Ticket vending machine provides Purchase Ticket use case for the Commuter and Bank actors.

The ultimate goal of the Commuter in relation to our ticket vending machine is to buy a ticket. So we have **Purchase Ticket** **use case**. Purchasing ticket might involve a bank, if payment is to be made using a debit or credit card. So we are also adding another actor - **Bank**. Both actors participating in the use case are connected to the use case by association.

Use case **behaviors** may be described in a natural language text (opaque behavior), which is current common practice, or by using UML **behavior diagrams**. UML tools should allow binding behaviors to the described use cases. Example of such binding of the Purchase Ticket use case to the behavior represented by activity is shown below using UML 2.5 notation.



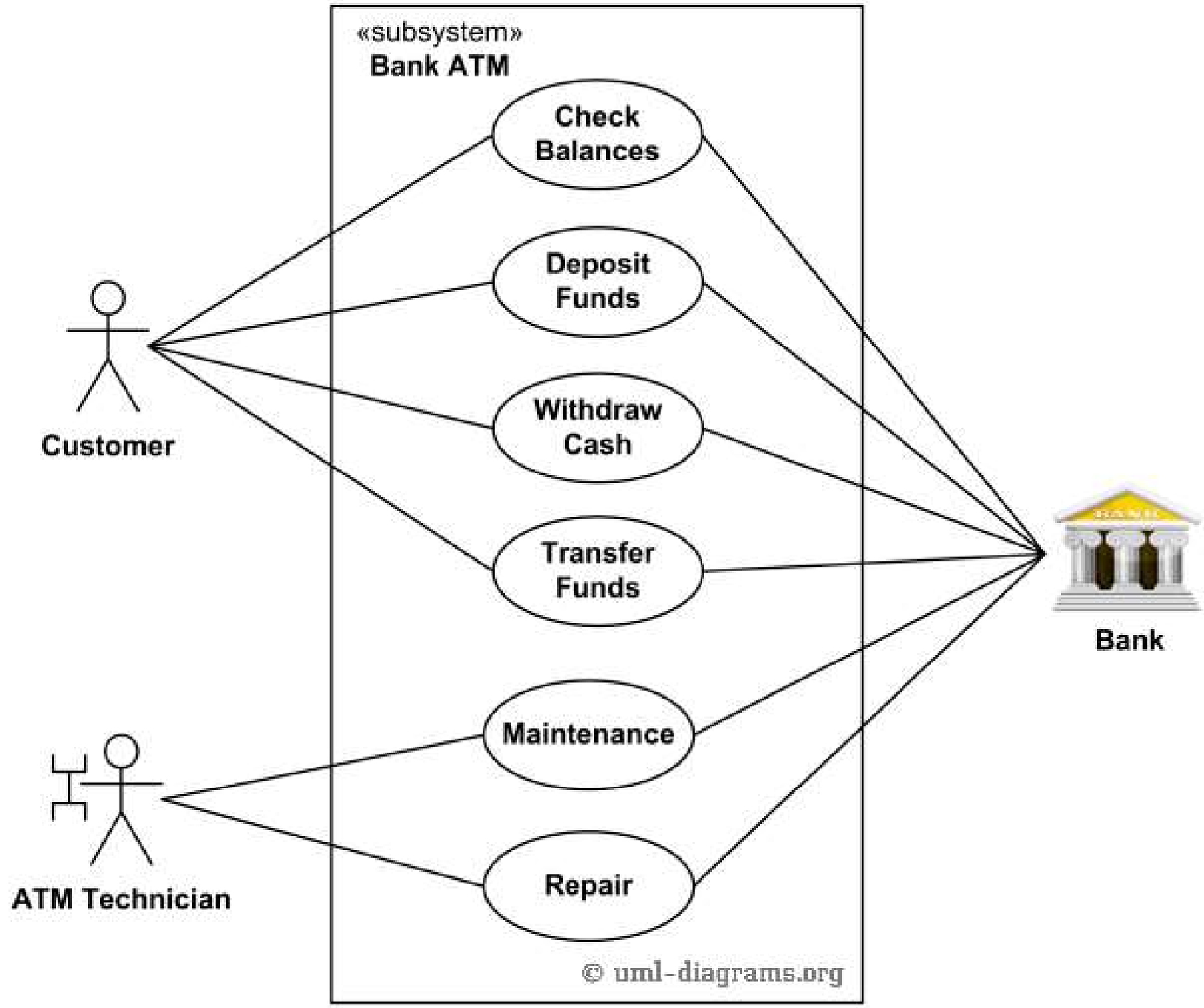
Purchase Ticket use case owns behavior represented by Purchase Ticket activity.

Bank ATM

UML Use Case Diagram Examples

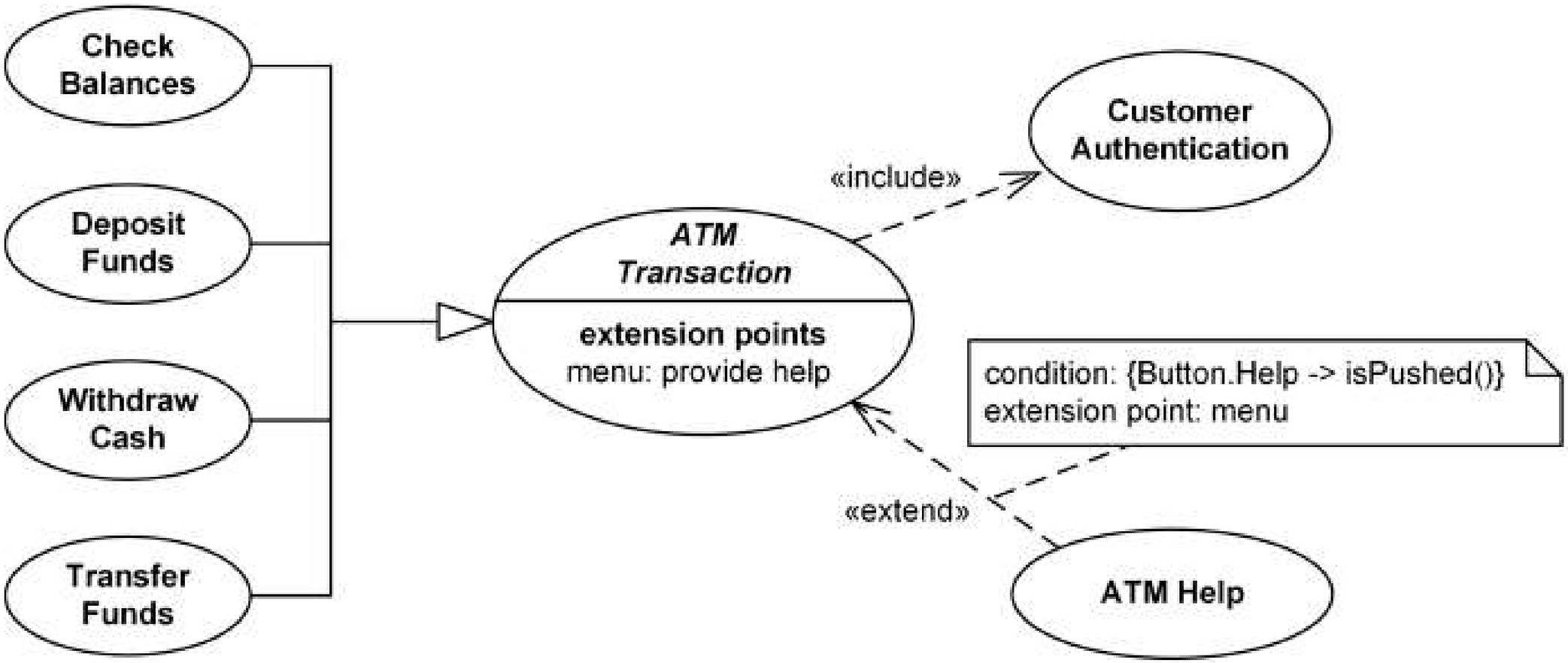
An automated teller machine (**ATM**) or the automatic banking machine (**ABM**) is a banking subsystem (**subject**) that provides bank customers with access to financial transactions in a public space without the need for a cashier, clerk, or bank teller.

Customer (**actor**) uses bank ATM to *Check Balances* of his/her bank accounts, *Deposit Funds*, *Withdraw Cash* and/or *Transfer Funds* (**use cases**). *ATM Technician* provides *Maintenance* and *Repairs*. All these use cases also involve *Bank* actor whether it is related to customer transactions or to the ATM servicing.


«subsystem»
Bank ATM
Check Balances
Deposit Funds
Withdraw Cash
Transfer Funds
Maintenance
Repair
Customer
ATM Technician
Bank
© uml-diagrams.org

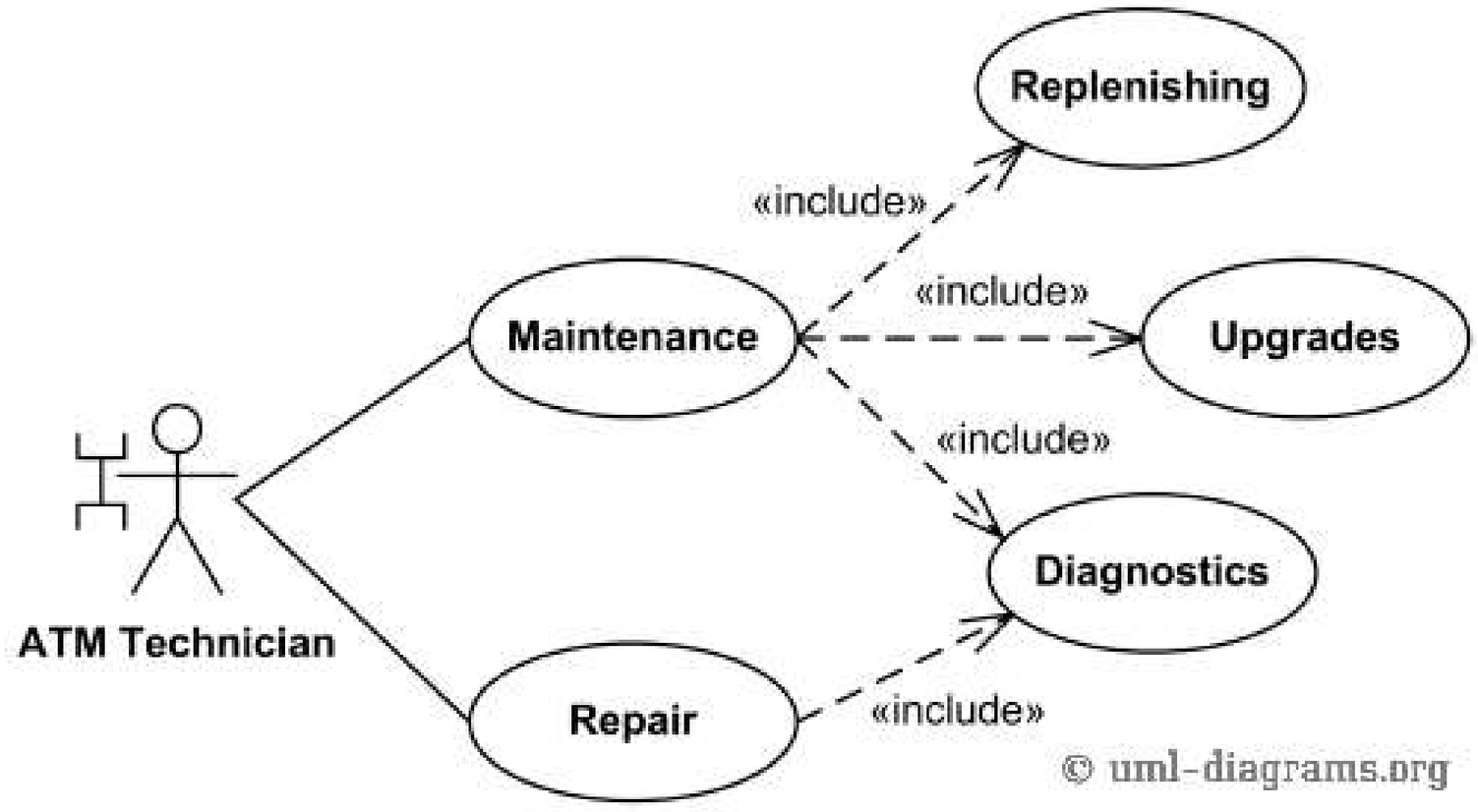
An example of use case diagram for Bank ATM subsystem - top level use cases.

On most bank ATMs, the customer is authenticated by inserting a plastic ATM card and entering a personal identification number (PIN). *Customer Authentication* use case is required for every ATM transaction so we show it as **include** relationship. Including this use case as well as transaction **generalizations** make the *ATM Transaction* an **abstract use case**.



Bank ATM Transactions and Customer Authentication Use Cases Example.

Customer may need some help from the ATM. *ATM Transaction* use case is **extended** via **extension point** called *menu* by the *ATM Help* use case whenever *ATM Transaction* is at the location specified by the *menu* and the bank customer requests help, e.g. by selecting Help menu item.



Bank ATM Maintenance, Repair, Diagnostics Use Cases Example.

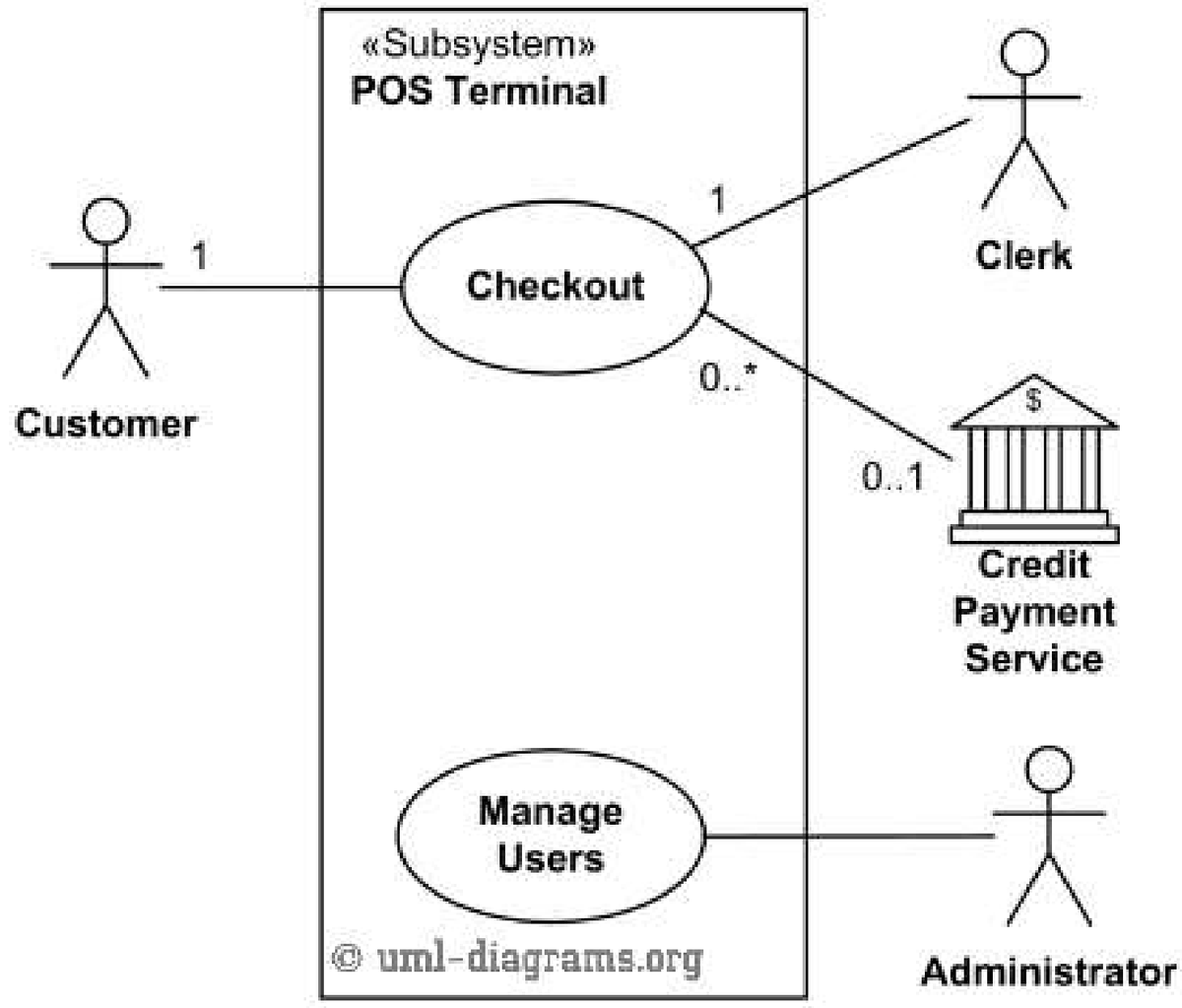
ATM Technician maintains or repairs Bank ATM. *Maintenance* use case includes *Replenishing* ATM with cash, ink or printer paper, *Upgrades* of hardware, firmware or software, and remote or on-site *Diagnostics*. *Diagnostics* is also **included** in (shared with) *Repair* use case.

Point of Sales Terminal

UML Use Case Diagram Example

An example of UML **use case diagram** for **Point of Sale (POS) Terminal** or Checkout. A retail POS system typically includes a computer, monitor, keyboard, barcode scanners, weight scale, receipt printer, credit card processing system, etc. and POS terminal software.

Checkout **use case** involves Customer, Clerk and Credit Payment Service **actors** and **includes** scanning items, calculating total and taxes, payment use cases.

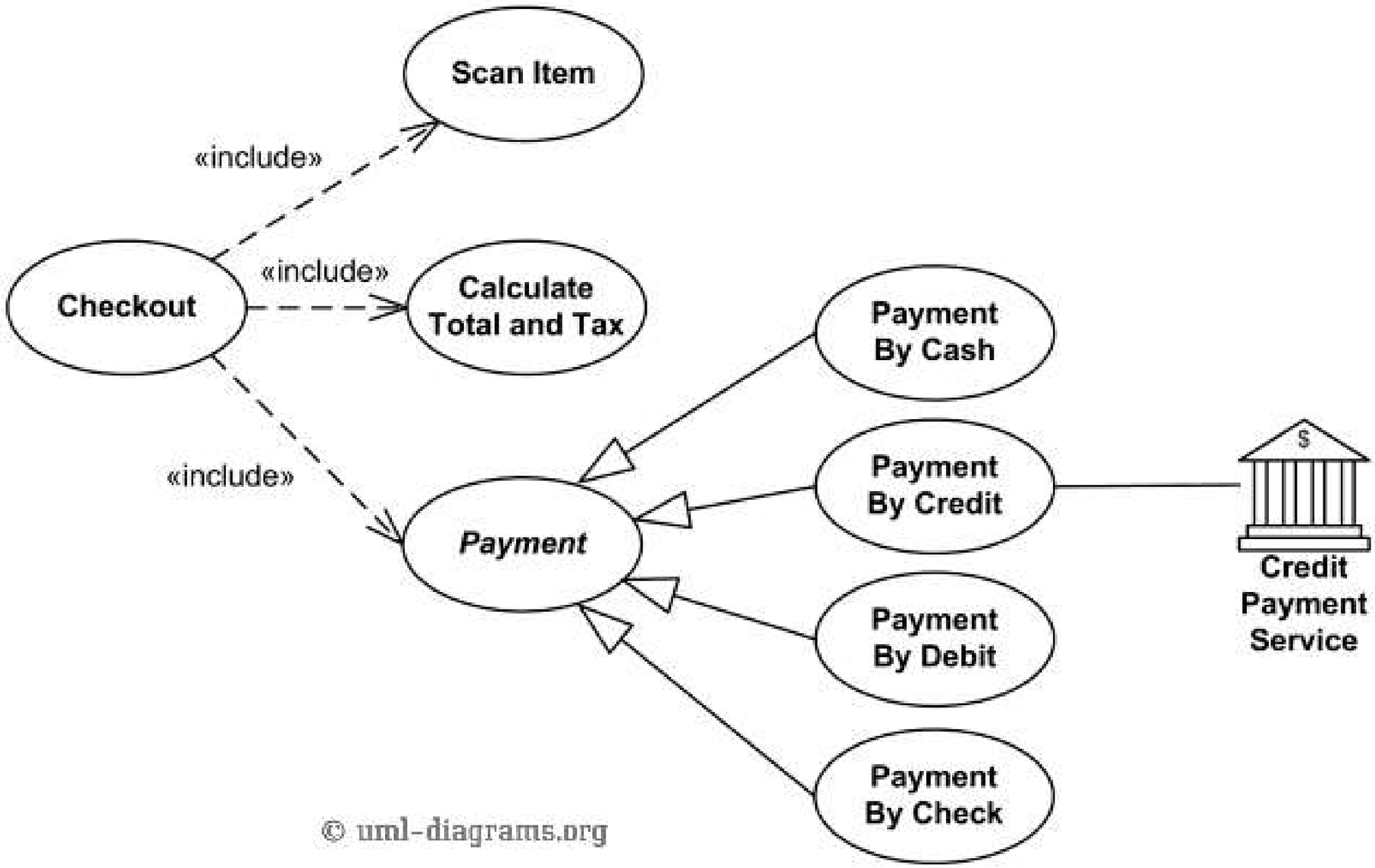


Top level UML use cases for Point of Sales Terminal (POS).

Checkout use case requires Customer actor, hence the 1 multiplicity of Customer. Clerk can only participate in a single Checkout use case. Credit Payment Service can participate with many Checkout use cases at the same time. Checkout use case may not need Credit Payment Service (for example, if payment is in cash), thus the 0..1 multiplicity.

Checkout use case is an example of a large and complex use case split into several use cases each describing some logical unit of behavior. Note, that including use case becomes incomplete by itself and requires the included use cases to be

complete.



Checkout use case includes Scan Item, Calculate Total and Tax, and Payment use cases.

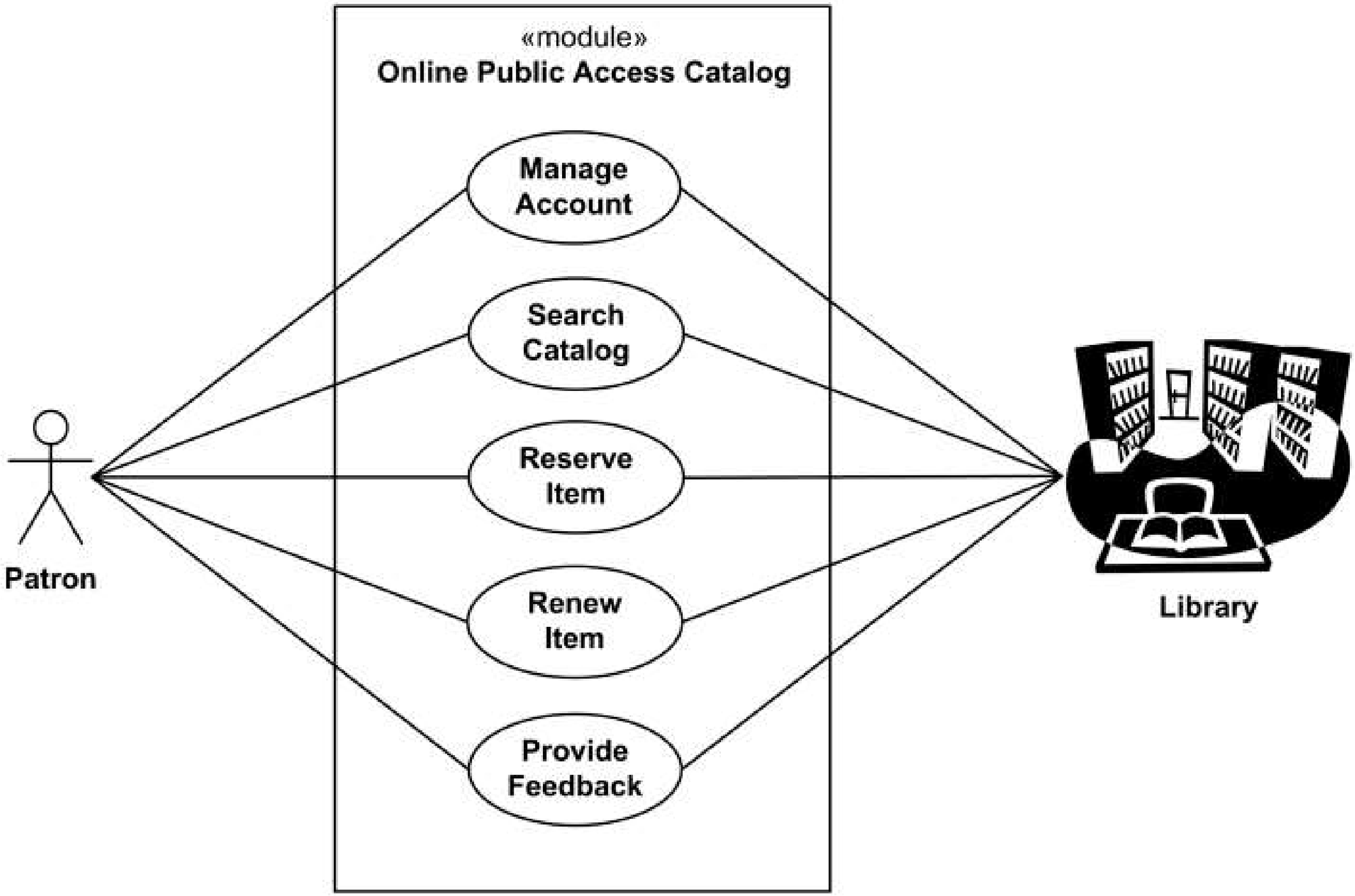
Payment use case is represented using **generalization** relationship. It means that only one specific type of payment is accepted - either by cash, or by credit, debit, or with check. An alternative to such representation could be to use **include** relationship so that not just single but several forms of payment could be accepted from the same client during checkout.

Online Library Public Access Catalog

UML Use Case Diagram Examples

An **Online Public Access Catalog** (**OPAC**) is an e-Library website which is part of **Integrated Library System** (ILS), also known as a **Library Management System** (LMS), and managed by a library or group of libraries.

Patrons of the library can search library catalog online to locate various resources - books, periodicals, audio and visual materials, or other items under control of the library. Patrons may reserve or renew item, provide feedback, and manage their account.



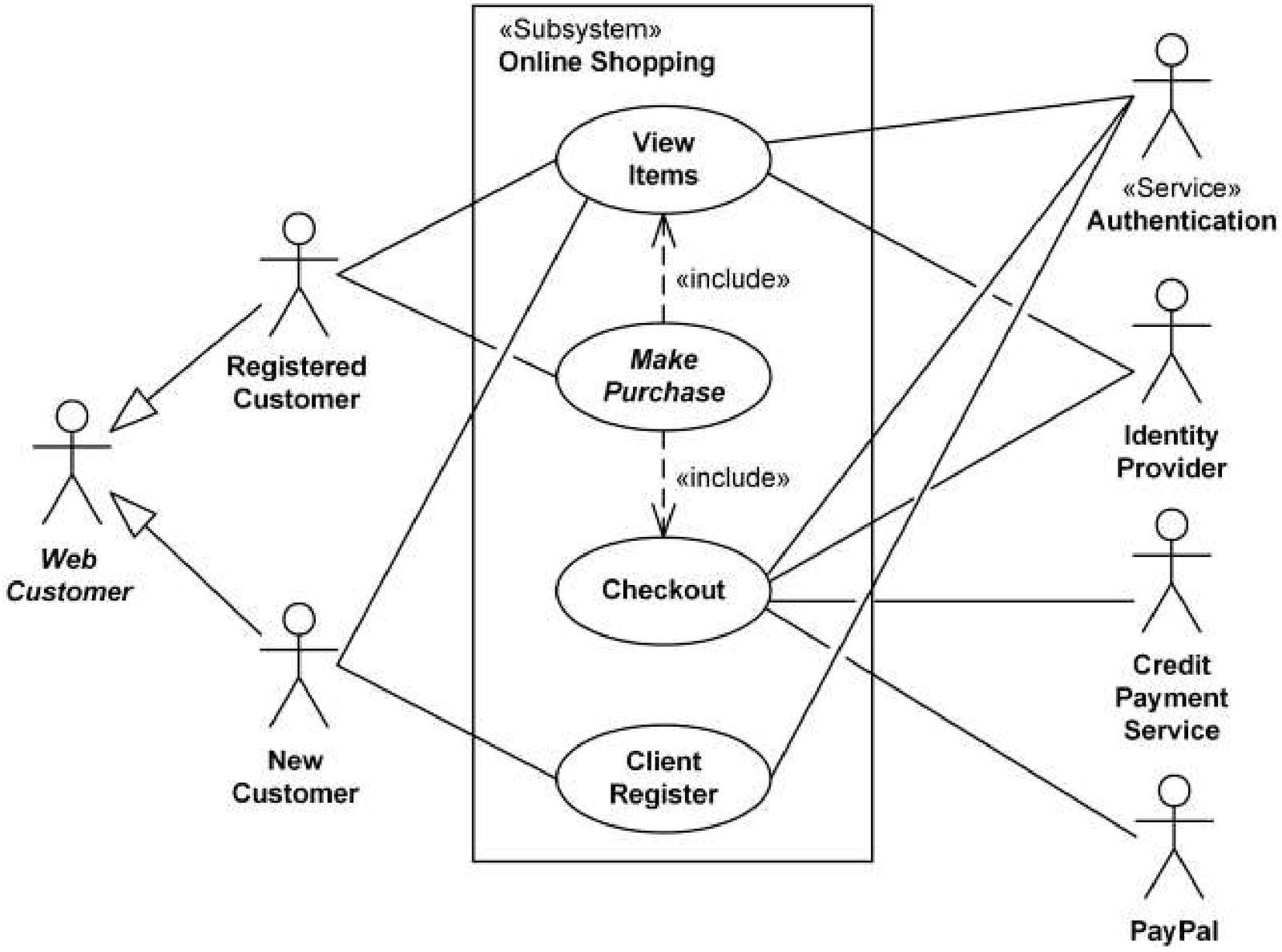
An example of UML use case diagram for e-Library Online Public Access Catalog.

Online Shopping

UML Use Case Diagram Example

Web Customer **actor** uses some web site to make purchases online. Top level **use cases** are **View Items**, **Make Purchase** and **Client Register**. View Items use case could be used by customer as top level use case if customer only wants to find and see some products. This use case could also be used as a part of Make Purchase use case. Client Register use case allows customer to register on the web site, for example to get some coupons or be invited to private sales. Note, that **Checkout** use case is **included use case** not available by itself - checkout is part of making purchase.

Except for the **Web Customer** actor there are several other actors which will be described below with detailed use cases.



Online shopping UML use case diagram example - top level use cases.

View Items use case is **extended** by several optional use cases - customer may search for items, browse catalog, view items recommended for him/her, add items to shopping cart or wish list. All these use cases are extending use cases because they provide some optional functions allowing customer to find item.

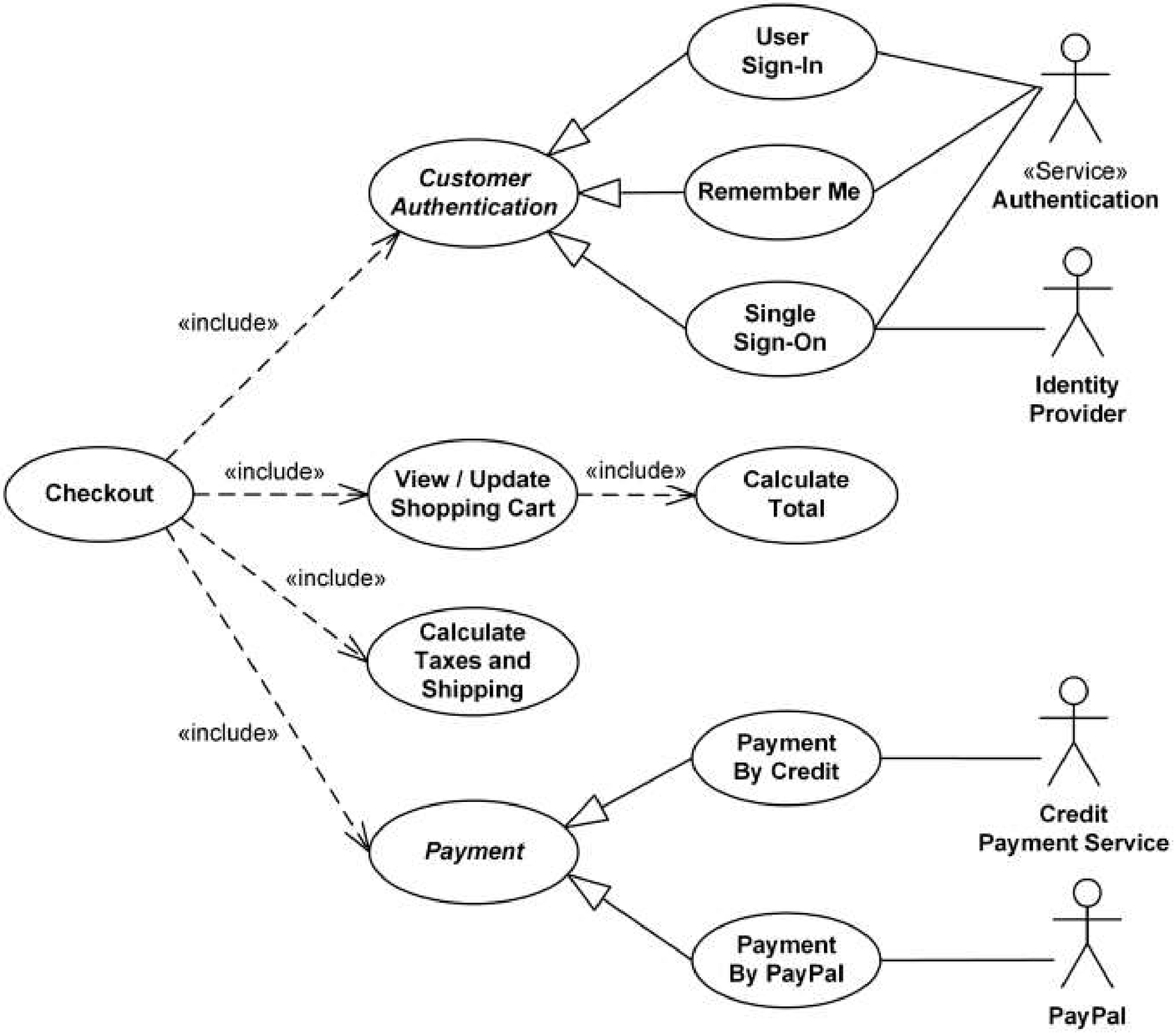
Customer Authentication use case is **included** in **View Recommended Items** and **Add to Wish List** because both require the

customer to be authenticated. At the same time, item could be added to the shopping cart without user authentication.

Online shopping UML use case diagram example - view items use case.

Checkout use case includes several required uses cases. Web customer should be authenticated. It could be done through user login page, user authentication cookie ("Remember me") or Single Sign-On (SSO). Web site authentication service is used in all these use cases, while SSO also requires participation of external identity provider.

Checkout use case also includes **Payment** use case which could be done either by using credit card and external credit payment service or with PayPal.



Online shopping UML use case diagram example - checkout, authentication and payment use cases.

Online Shopping - Credit Cards Processing

UML Use Case Diagram Example

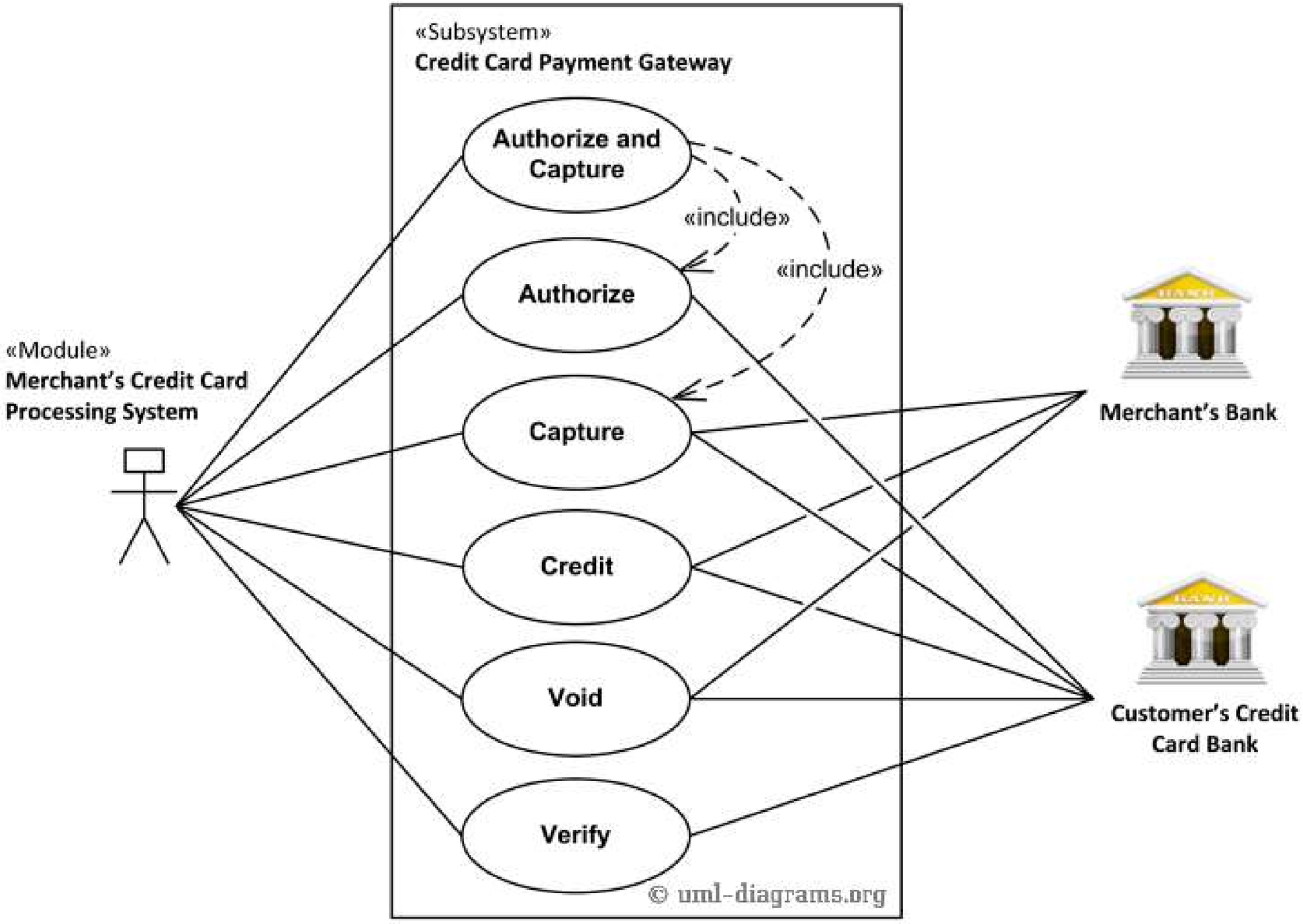
This UML use case diagram example shows some use cases for a system which processes credit cards.

Credit Card Processing System (aka Credit Card Payment Gateway) is a **subject**, i.e. system under design or consideration. Primary **actor** for the system is a **Merchant's Credit Card Processing System**. The merchant submits some credit card transaction request to the credit card payment gateway on behalf of a customer. Bank which issued customer's credit card is actor which could approve or reject the transaction. If transaction is approved, funds will be transferred to merchant's bank account.

Authorize and Capture use case is the most common type of credit card transaction. The requested amount of money should be first authorized by **Customer's Credit Card Bank**, and if approved, is further submitted for settlement. During the settlement funds approved for the credit card transaction are deposited into the **Merchant's Bank** account.

In some cases, only **authorization** is requested and the transaction will not be sent for settlement. In this case, usually if no further action is taken within some number of days, the authorization expires. Merchants can submit this request if they want to verify the availability of funds on the customer's credit card, if item is not currently in stock, or if merchant wants to review orders before shipping.

Capture (request to capture funds that were previously authorized) use case describes several scenarios when merchant needs to complete some previously authorized transaction - either submitted through the payment gateway or requested without using the system, e.g. using voice authorization.



UML use case diagram example for a credit cards processing system.

Credit use case describes situations when customer should receive a refund for a transaction that was either successfully processed and settled through the system or for some transaction that was not originally submitted through the payment gateway.

Void use case describes cases when it is needed to cancel one or several related transactions that were not yet settled. If possible, the transactions will not be sent for settlement. If the Void transaction fails, the original transaction is likely already settled.

Verify use case describes zero or small amount verification transactions which could also include verification of some client's data such as address.

You can find excellent resources, documentation, white papers, guides, etc. related to the credit card processing at **Authorize.Net - Payment Gateway to Accept Online Payments.**

Website Administration

UML Use Case Diagram Example

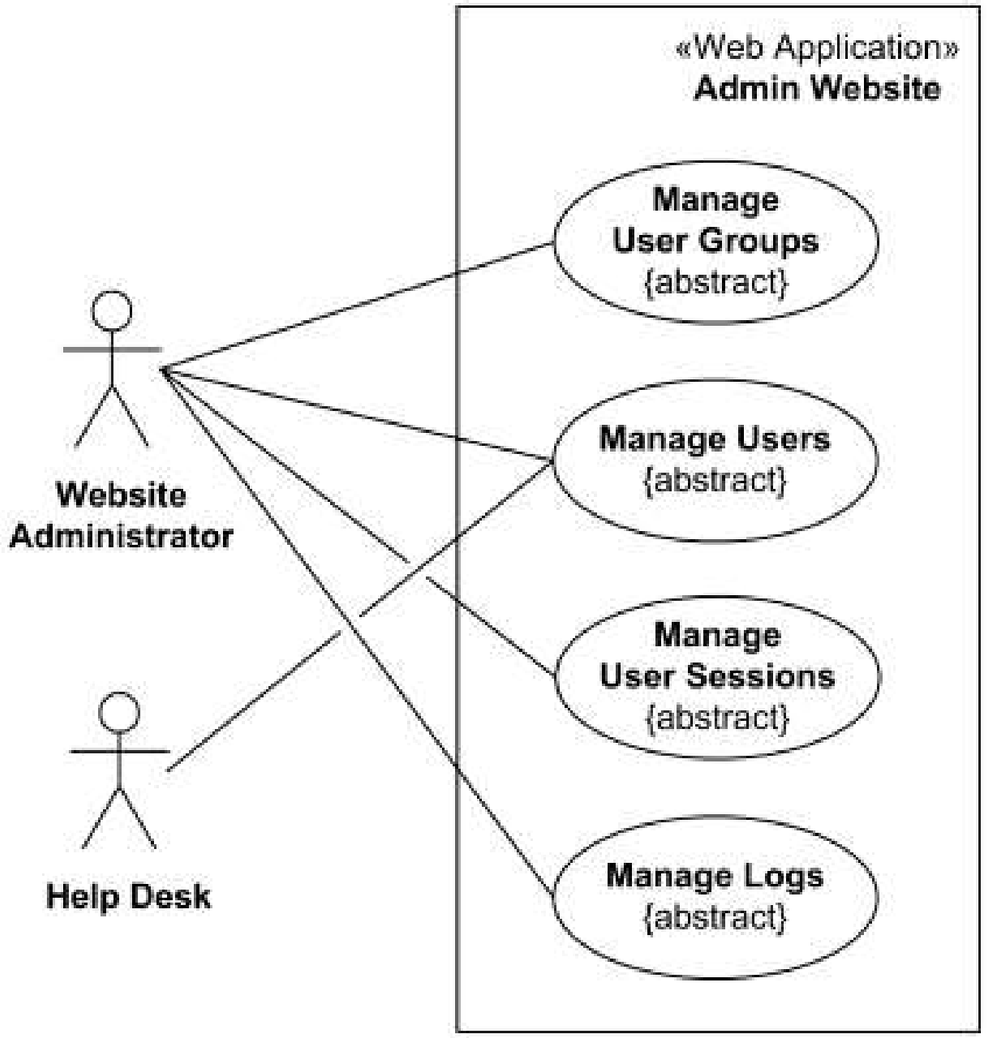
Website security requirements mandate separation of administrative interfaces from common functions provided to users. This segregation, for example, is required by the Sarbanes Oxley (SOX) in US and is strongly recommended by ISO 17799.

System should have separate applications for administrators and for common users. It is recommended by ***OWASP Guide 2.0*** that website administration applications should not be accessible from the internet without going through some management networks, e.g. via a strongly authenticated VPN or from a trusted network operations center.

Except for administrators, some part of the administrative interfaces should be also available to the Help desk staff, as they need to be able to assist customers having issues while using the customer oriented website.

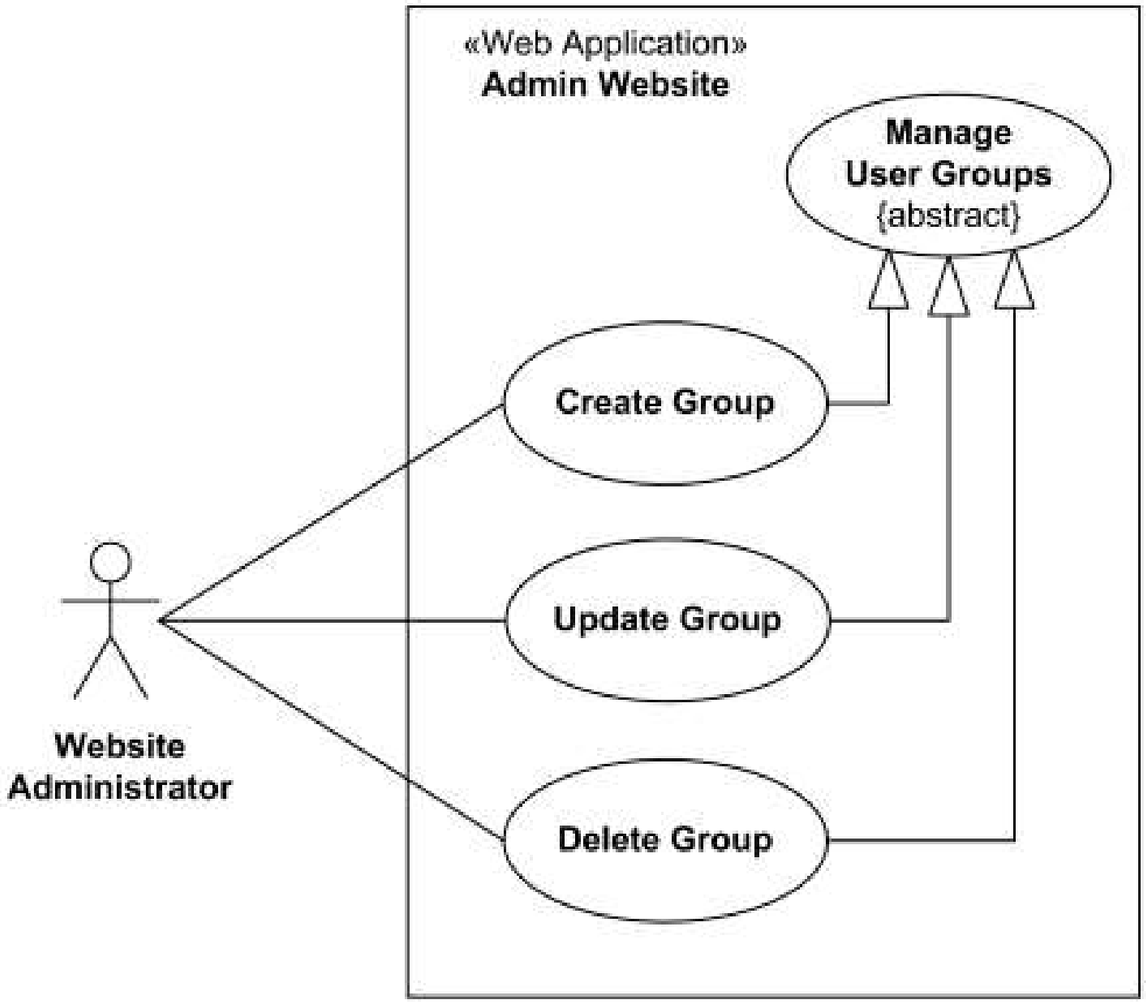
Top level use case diagram below shows some administrative functions that administration website could provide.

Two **actors** using administrative interfaces are **Website Administrator** and **Help Desk**. Help Desk uses a subset of functions available to the Website Administrator. All top level **use cases** shown are abstract as each represents some group or "package" of administrative functionality.



Top level use case diagram for the administration website.

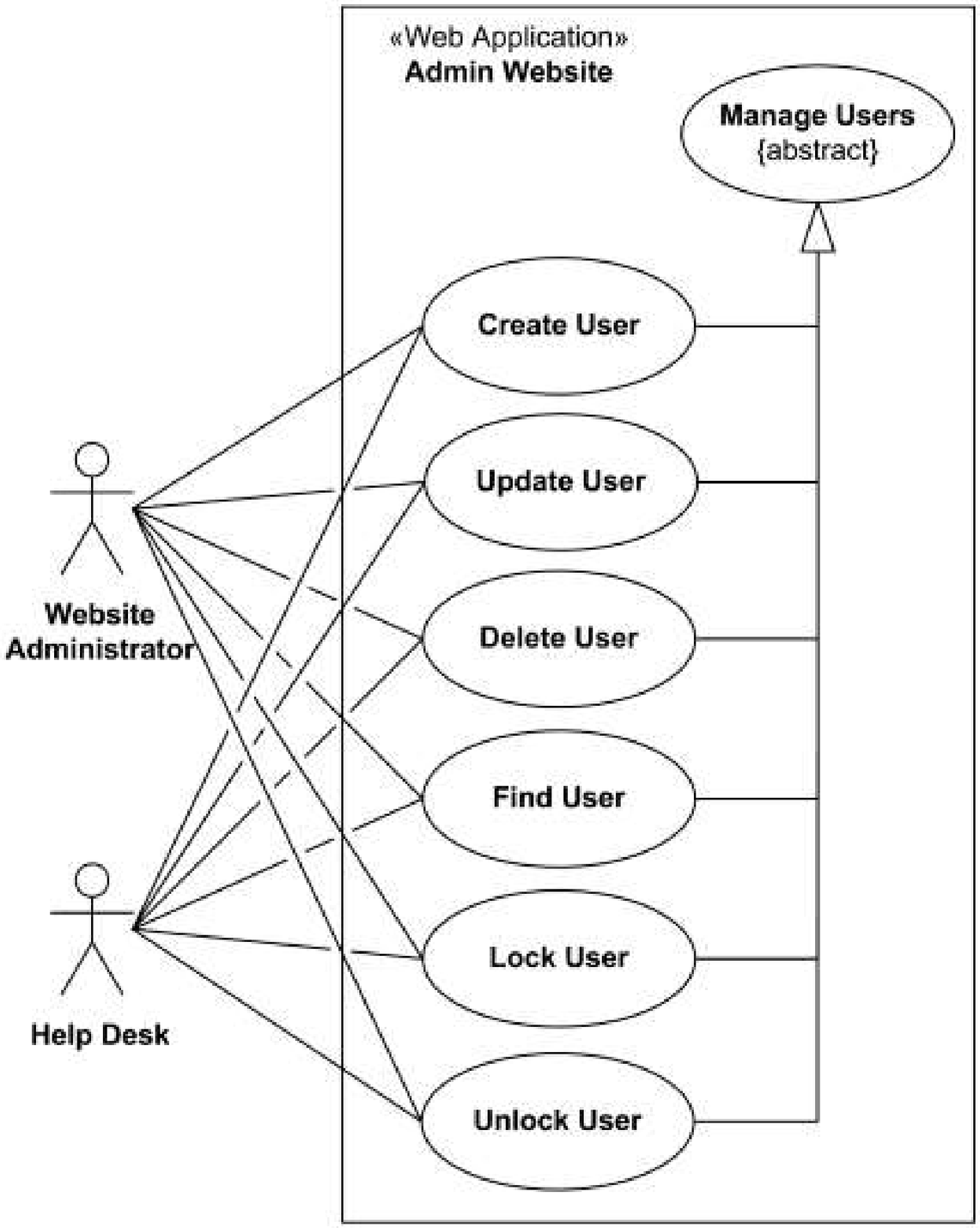
Manage User Groups abstract use case is specialized by **Create Group**, **Update Group**, and **Delete Group** use cases. The idea is that website administrator could create different user groups, for example, having different privileges or options, and later some user groups could be modified or even deleted.



User group management use case diagram for the administration website.

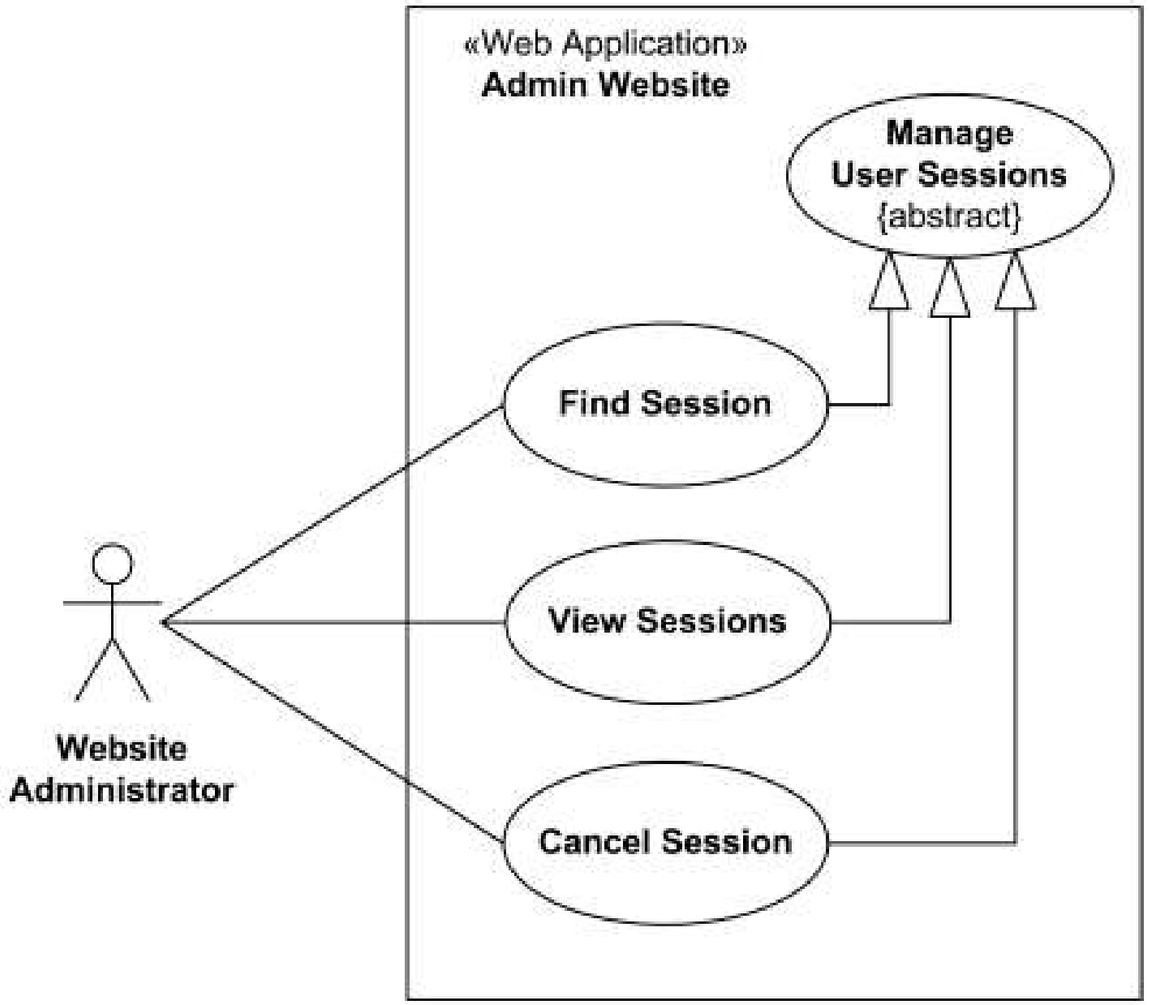
User management use cases are available both to the **Website Administrator** and to the **Help Desk**. There is standard user CRUD (Create, Retrieve/Find, Update, Delete) functionality set.

Two other use cases, **Lock User** and **Unlock User** are specific to website security. For example, if during some predefined period of time there were several unsuccessful login attempts using wrong user password, user account should be locked for some predefined time to prevent possible brute force password guessing attack. This locking and unlocking is usually done automatically by intrusion detection or website authentication subsystem, but this functionality needs to be available in the manual mode too, just in case. For example, some user might call and ask to lock his or her account.



User management use case diagram for the administration website.

User session is created either for each new incoming request that is not yet part of a session, or/and after user was authenticated. Website administrator should have ability to see how many sessions were created, including some statistics about sessions, to find some specific session and see status of that session, and to cancel (delete) some session, if required.

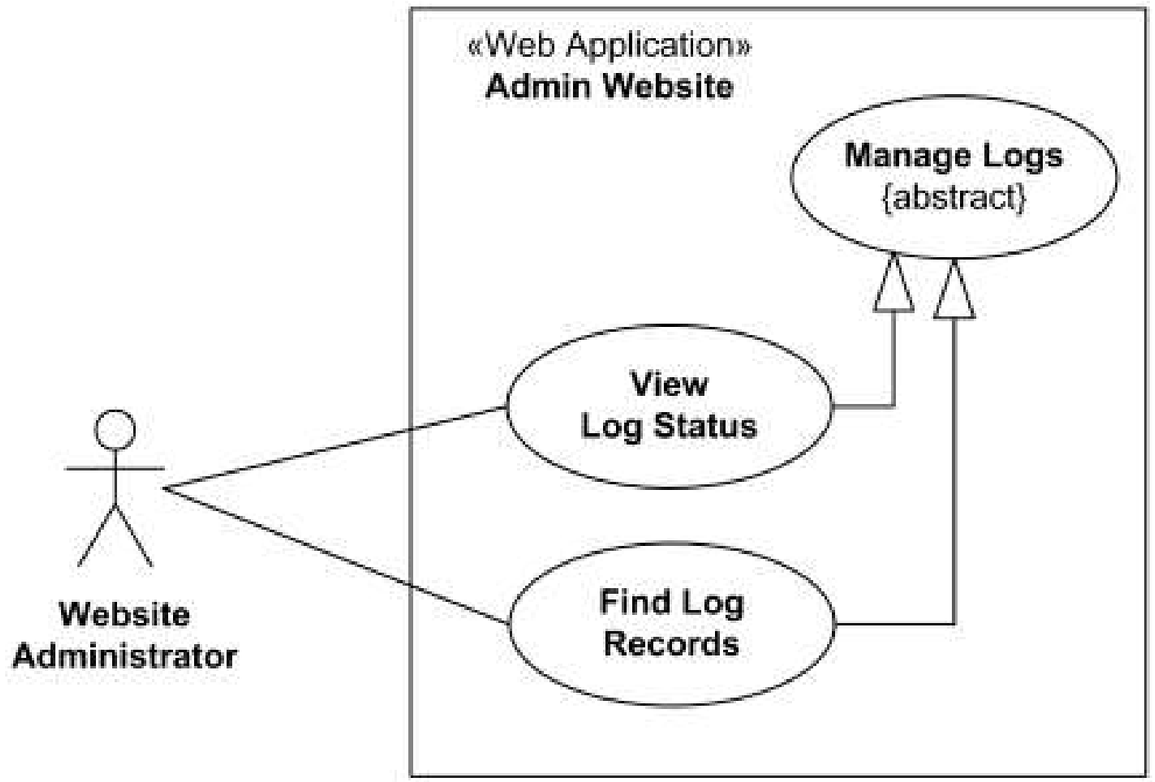


User sessions management use case diagram for the administration website.

List of administrative functions included in the **log management** depend on the security requirements supported and implemented by the website.

It is a standard security requirement (e.g., see ***OWASP Guide 2.0***) for the logs that new records can be only appended while older log records should not be rewritten or deleted. It could be implemented e.g. by writing logs to a write once / read many (WORM) device such as a CD-R.

Website administrator should be able to see status of logs. The status could include verification that logging is still functional (there is enough space on disk and/or connection to database is not stale), and that older log files are on schedule being moved to a permanent storage for archiving.



Logs management use case diagram for the administration website.

It is also common requirement to allow website administrator to find and see some log records related to a specific user or an exceptional situation.

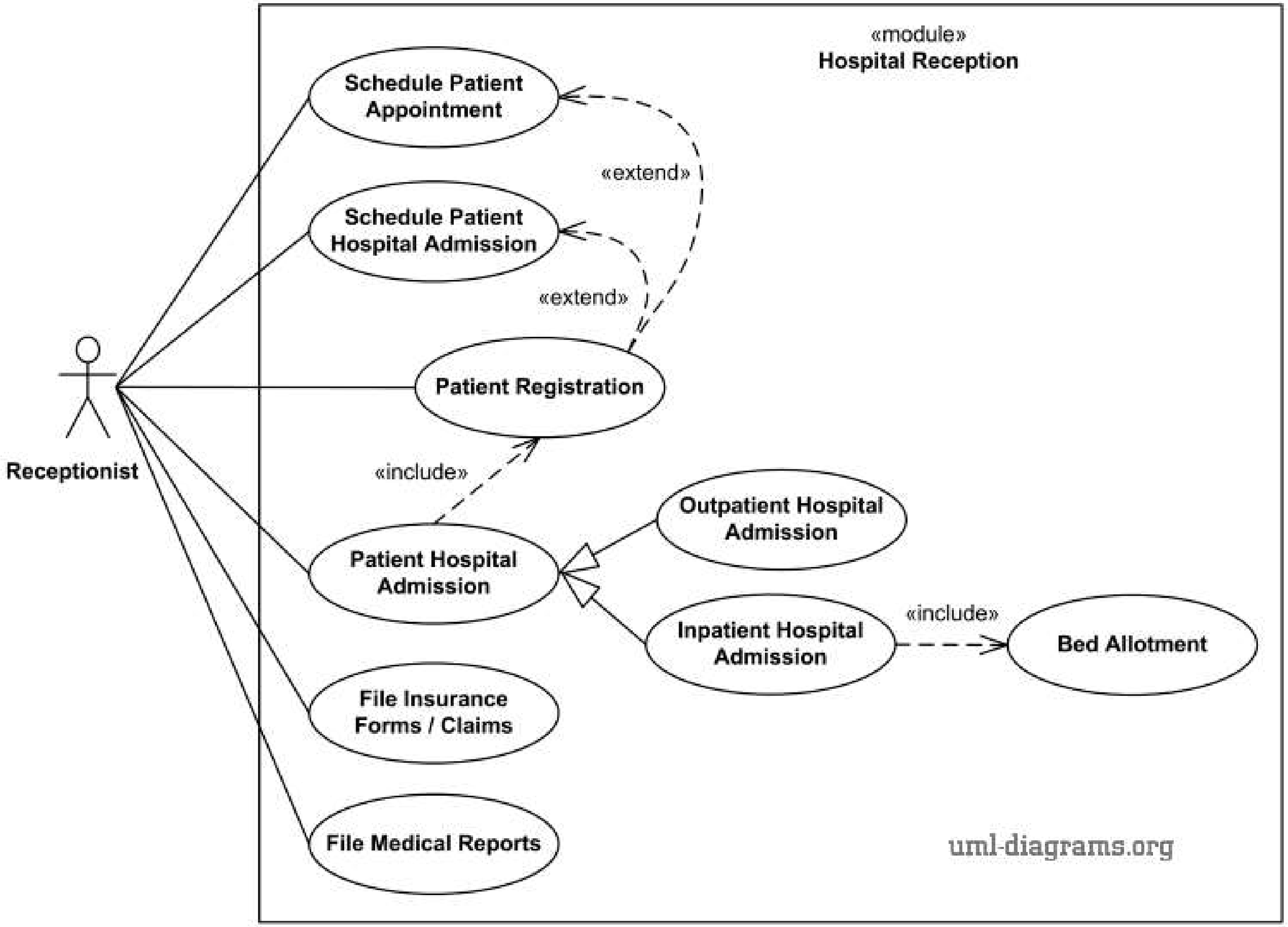
Hospital Management

UML Use Case Diagram Example

Hospital Management System is a large system including several subsystems or modules providing variety of functions. UML use case diagram example below shows actor and use cases for a hospital's reception.

Purpose: *Describe major services (functionality) provided by a hospital's reception.*

Hospital Reception subsystem or module supports some of the many job duties of hospital receptionist. Receptionist schedules patient's appointments and admission to the hospital, collects information from patient upon patient's arrival and/or by phone. For the patient that will stay in the hospital ("inpatient") she or he should have a bed allotted in a ward. Receptionists might also receive patient's payments, record them in a database and provide receipts, file insurance claims and medical reports.



An example of use case diagram for Hospital Reception.

Radiology Diagnostic Reporting

UML Use Case Diagram Example

Integrating the Healthcare Enterprise (IHE) is an initiative promoting the use of standards to achieve interoperability of **Health Information Technology (HIT)** systems and effective use of **Electronic Health Records (EHRs)**.

IHE publishes the implementation guides called **IHE Profiles** incorporated in the appropriate **IHE Technical Framework** after successful testing and deployment in the real-world healthcare settings.

The **Simple Image and Numeric Report (SINR)** ***[IHE Radiology Integration Profile, IHE RAD TF Vol. 1, Rev. 11.0]*** facilitates the growing use of digital dictation, voice recognition, and specialized reporting packages, by separating the functions of diagnostic reporting into discrete actors for creation, management, storage and report viewing. Separating these functions while defining transactions to exchange the reports between them enables a vendor to include one or more of these functions in an actual system.

The **IHE Technical Framework (TF)** identifies **IHE Actors** - functional components of a healthcare enterprise from the point of view of their interactions in distributed healthcare environment. On the example diagram below we show **IHE Actors** as **UML actors** notated as **classifiers** marked with radiology icon.

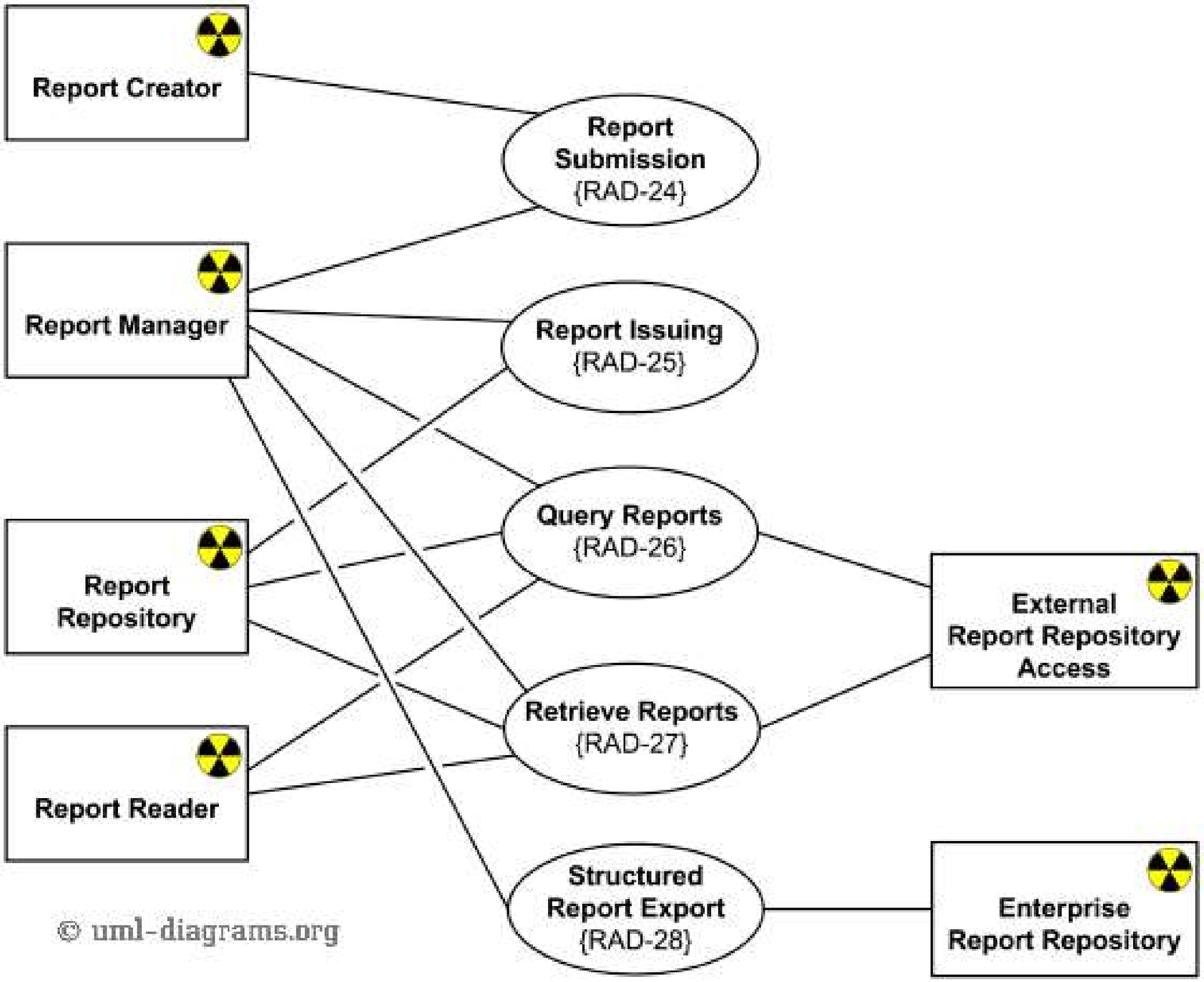
IHE TF also specifies a set of coordinated, standards-based interactions between IHE Actors, called **IHE Transactions**. Transactions transfer required information through standards-based messages. On the example diagram below we show **IHE Transactions** as **UML use cases**.

IHE **Diagnostic Report Process Flow** describes the typical process flow related to the diagnostic reporting. The IHE transactions of this flow are RAD-24 through RAD-27.

In the initial stage of diagnostic reporting, a **reading physician** records a diagnosis by generating a draft **DICOM Structured Report (SR)** object. In the **Report Submission** transaction, **Report Creator** actor transmits that DICOM SR object in an initial draft or final state to the **Report Manager**. The Structured Report object is required minimally to conform to the template TID 2000. DICOM Structured Reports offer the capability to encode arbitrarily structured diagnostic report data.

The **Simple Image Report** allows documents with multiple sections (with headings) containing report text and references to relevant images. Some text items of these documents may also be related to specific images. This allows a reading physician to identify one or more images from which their conclusions were inferred. This kind of reports (aka "content pattern") should use the DICOM Basic Text SR Information Object Definition (IOD) and Basic Image Diagnostic Report Template (TID 2000 in DICOM 2011 PS3.16).

The **Simple Image and Numeric Report** is similar to the Simple Image Report but allows the addition of numeric values. This enables a diagnosis to include measurements and other numeric values. This kind of reports should use the DICOM Enhanced SR IOD and Basic Image Diagnostic Report Template (TID 2000 in DICOM 2011 PS3.16).



Radiology diagnostic reporting UML use case diagram example
for Simple Image and Numeric Report (SINR) IHE Radiology Integration Profile.

Reports are processed and modified by the **Report Manager** IHE actor. This involves adding and changing report data as well as verifying draft reports. In all cases, any change in the report content by the Report Manager leads to the creation of a new DICOM SR object. At any time, the Report Manager can transmit reports to the **Report Repository** for external access, but at a minimum the final report must be sent to the Report Repository.

In the **Report Issuing** transaction, the Report Manager transmits either an unchanged draft DICOM SR or a new modified DICOM SR to the Report Repository. The Report Manager handles all state and content changes to DICOM Structured Reports, and with each change new DICOM Structured Report objects are created and may be stored in the Report Repository.

The **Report Repository** provides permanent storage of DICOM Structured Reports. It also allows reports to be queried and retrieved throughout the enterprise by **Report Readers**.

The **Report Reader** provides a user interface to view DICOM Structured Reports. DICOM SRs are queried and retrieved by the Report Reader from the **Report Repository** or the **External Report Repository Access**.

The **External Report Repository Access** actor is a gateway to obtain other enterprise department reports, such as Laboratory and Pathology, from within the Imaging department.

In the Structured Report Export [RAD-28] transaction, the Report Manager transmits verified Structured Reports as unsolicited HL7 observations to the **Enterprise Report Repository**. The Enterprise Report Repository receives diagnostic reports in HL7 format. The Report Manager is responsible for mapping DICOM SR to HL7.

Software Protection and Licensing

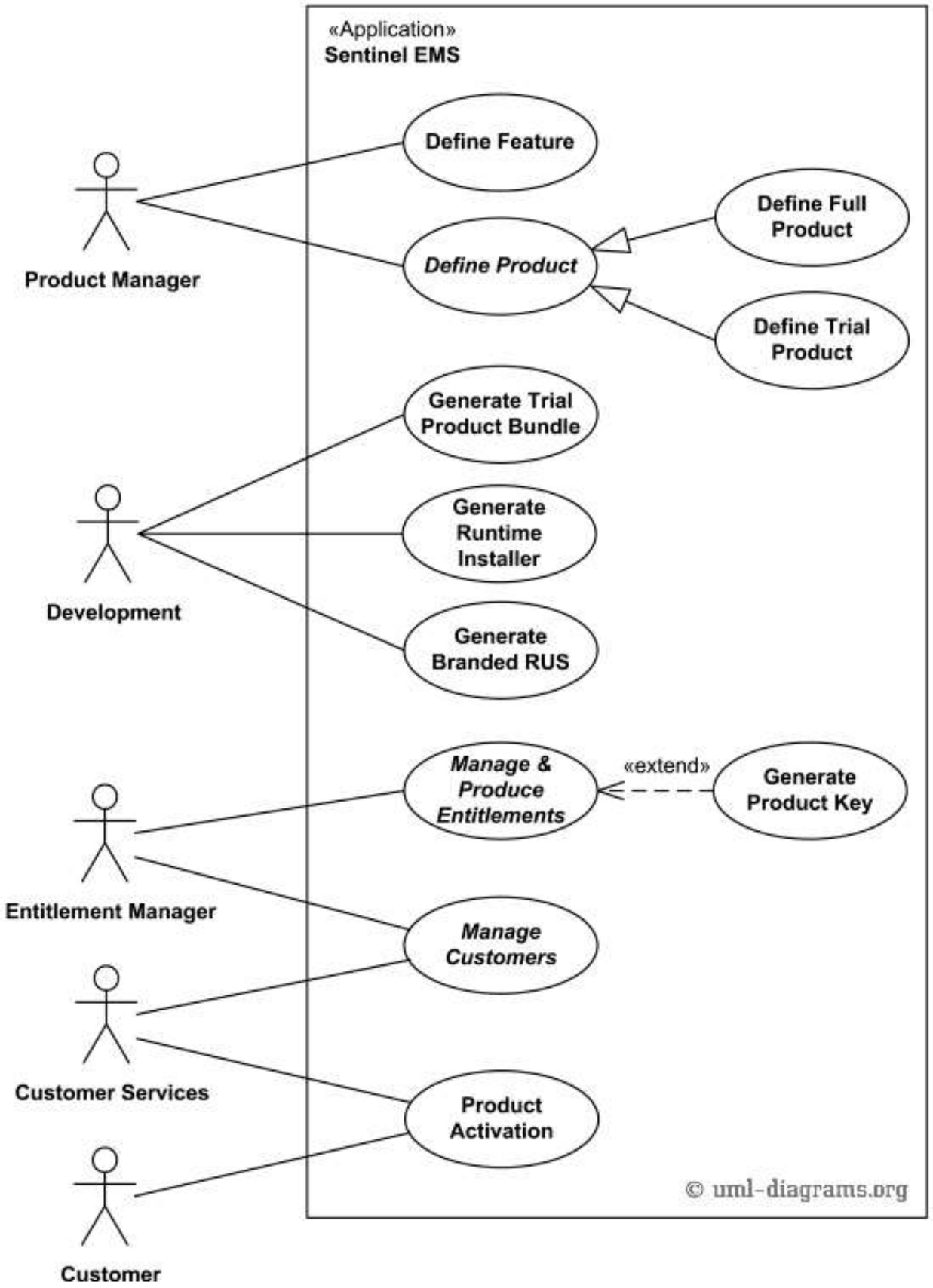
UML Use Case Diagram Example

Sentinel License Development Kit (Sentinel LDK) is a Software Digital Rights Management (DRM) solution by SafeNet Inc. that delivers strong copy protection, protection for Intellectual Property (IP), and secure and flexible licensing. Sentinel LDK separates licensing and production processes (implemented with Sentinel EMS) from the software protection process (implemented with Sentinel Licensing API or Sentinel LDK Envelope).

Sentinel EMS is a web-based graphical application provided as part of Sentinel LDK that is used to perform a range of functions required to manage the licensing, production, distribution, customer support, and maintenance of protected applications. This application is a role-based application designed to manage the business activities required to implement and maintain Sentinel LDK in the organization which needs to protect its software. Sentinel EMS Server maintains a database containing a wide range of information, including data related to product features, licenses, sales, orders, and customers.

Use case diagram below shows some simplified view of software licensing use cases supported by Sentinel EMS Application (shown as «Application» stereotyped subject). The Sentinel EMS handles three major workflows:

- license planning,
- order processing and production, and
- activation of trial software.


«Application»
Sentinel EMS
Define Feature
Define Full Product
Define Product
Define Trial Product
Generate Trial Product Bundle
Generate Runtime Installer
Generate Branded RUS
Manage & Produce Entitlements
«extend»
Generate Product Key
Manage Customers
Product Activation
© uml-diagrams.org
Product Manager
Development
Entitlement Manager
Customer Services
Customer

Software licensing with Sentinel EMS application UML use case diagram example.

Product Manager defines Features and Products. Each Product has one or more Features. After Features and Products have been defined in Sentinel EMS, entitlements can be processed and produced using the Production group of functions.

Users assigned the Development role can fulfil one of the following development-related activities:

- Generate bundles of Provisional (Trial) Products
- Generate a customized Sentinel LDK Run-time Environment (RTE) installer file
- Customize the Sentinel Remote Update System utility (RUS utility)

Entitlement Manager defines and manages customers, and also enters and manages entitlements. An entitlement is the execution of a customer order for Sentinel LDK items, and can be either an order for Products to be supplied with one or more Sentinel protection keys, or a Protection Key Update that specifies changes to be made to the license terms and/or data stored in Sentinel protection keys that have already been deployed.

Customer Services role can manage customers the same way as Entitlement Manager does, and can also manage Product activation.

For entitlements that generate Product Keys, the customer receives an email from Sentinel EMS that contains the keys. The customer is able to log in to the EMS Customer Portal using the Product Key in order to activate the Product.