

Fist Start with the Identification of the Actors:

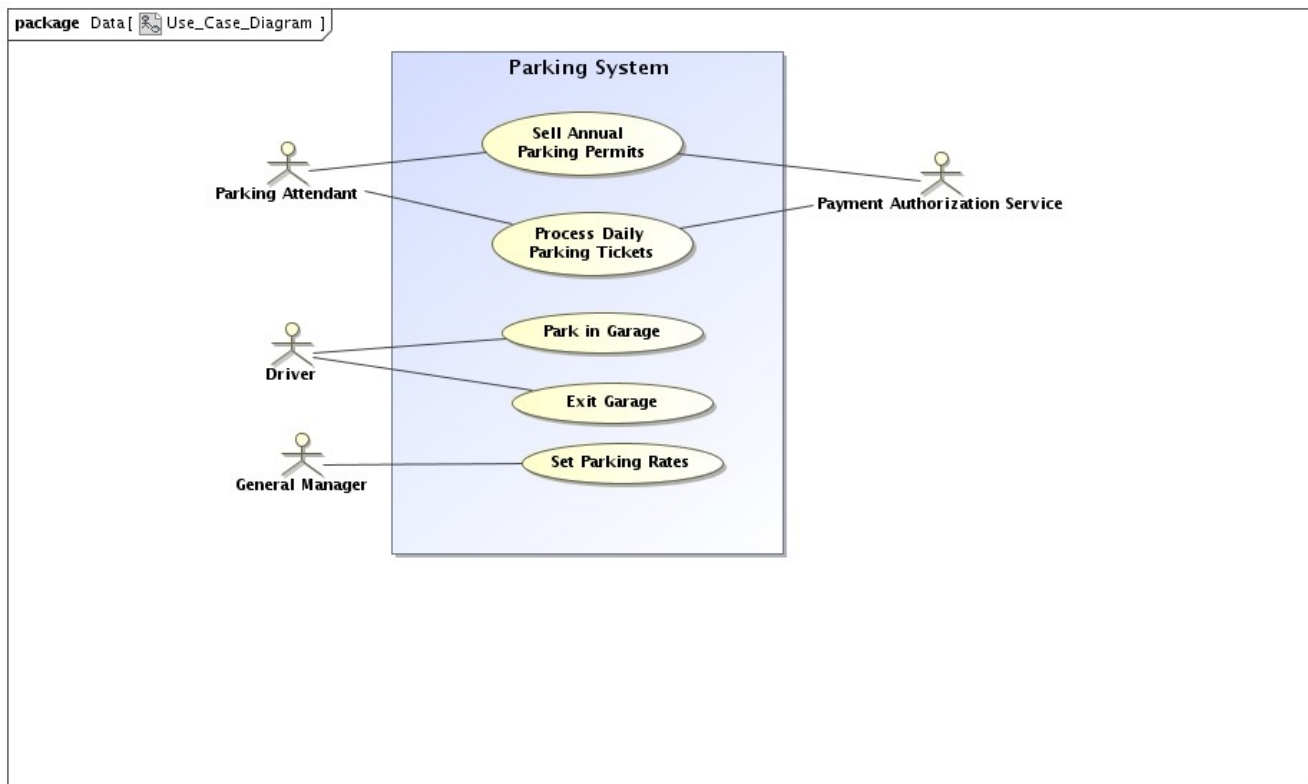
Who are the Actors?

1. Driver
2. Parking Attendant
3. Manager

What are their goals?

Make an actor/goal list:

Actor	Goal
Parking Attendant	1. Sell annual Parking Tickets 2. Process Daily Parking Tickets
Driver	1. Park in garage
General Manager	1. Set parking rates



Use Case UC1: Sell Annual Parking Permits

Scope: Parking Permit System

Level: Parking Attendant Goal

Primary Actor: Parking Attendant

Stakeholders and Interests:

- Driver: Wants an annual parking permit to let them into the garage when needed
- Parking Attendant: Wants accurate, fast entry to process the permit request accurately, with no errors as cash shortages result in monetary or employment penalty.
- General Manager: Wants to keep track of how many annual Permits are sold.
- University Administrator: Want to keep track of the revenue generated by the annual permits sold.
- Payment Authorization Service: Wants to receive digital authorization requests in the correct format and protocol. Wants to accurately account for their payables to the University

Preconditions: Parking Attendant is identified and authenticated.

Postconditions: Sale is saved. Receipt is generated. Payment authorization approvals are recorded
Annual Permit is authorized to the Driver with the associated identification number. The annual Permit can be used immediately for swiping in and out of the garage by the Driver.

Main Success Scenario:

Actor Action	System Responsibility
<ol style="list-style-type: none">1. Driver arrives at the Parking Attendant Station with the request purchase an Annual Parking Permit2. Parking Attendant starts a new sale3. Parking Attendant enters the Driver's information: Name, University ID, license plate number, car make and model.6. Parking Attendant tells the Driver the total and asks for payment.7. Driver pays.	<ol style="list-style-type: none">4. Records the drivers information, selects the parking lot identification number5. Presents total of the sale8. Handles the Payment9. Logs the completed sale and prints out the permit information onto a card used by the driver to swipe in an out of the parking garage10. Prints out receipt
<ol style="list-style-type: none">11. Hands Permit and receipt to the Driver	

Extensions (or Alternate Flow):

*a At any time, the Driver can cancel the sale:

1. The Parking Attendant Performs Cancel Sale Operation

2. The System Clears Out the Driver Data
3. The System sets up for another sale

*b At any time, System Fails:

System needs to ensure all previous transactions are saved.

1. The Parking Attendant restarts the System and logs back in

3a. Invalid University ID Number:

1. System signals the error and rejects the entry
2. Parking attendant responds to the error
 - 2a. The Parking attendant asks to see the University ID for manual entry
 1. Parking attendant manually enters the University ID into the System
 - 1a. The Driver does not produce a valid University ID
 1. Parking attendant cancels the sale

8a. Paying by cash:

1. Parking Attendant enters the cash amount tendered
2. System presents the cash due and releases the cash drawer
3. Cashier deposits the cash and returns the balance in cash to the Driver
4. System records the cash payment

8b. Paying by credit:

1. Driver enters the credit information
2. System displays the payment for verification
3. Parking attendant confirms
 - 3a. Parking attendant cancels payment step
 1. System cancels sale
 2. System clears out Driver data
 3. System sets up for another sale
4. System sends payment authorization request to external Payment Authorization Service, requesting payment approval
 - 4a. System fails to communicate with external system
 1. System signals error to Parking Attendant
 2. Parking attendant asks Driver for alternate payment
5. System receives payment approval, signals approval, releasing the cash drawer to store the signed receipt
 - 5a. System receives payment denial
 1. System signals denial to Parking attendant
 2. Parking attendant informs the Driver, requesting alternate payment
- 5b. Timeout waiting for the response
 1. System indicates timeout to Parking attendant
 2. Parking attendant may try again or ask driver for alternate payment
6. System records the credit payment, including the payment approval
7. System presents credit payment signature input mechanism
8. Parking attendant asks driver to sign
9. If signature is paper, Parking attendant places the approval printout into the cash drawer.

8c. Paying by Debit:

1. This is similar to the **Paying by Credit** above (8b), please refer to 8b: **Paying by Credit**

8d. Paying by Check:

1. Driver hands the check to the Parking attendant
2. Parking attendant enters the check information, including the account and routing numbers
 - 2a. Parking attendant cancels payment step
 1. System cancels sale
 2. System clears out Driver data
 3. System sets up for another sale
3. System sends payment authorization request to external Payment Authorization Service, requesting if funds are available
 - 3a. System fails to communicate with external system
 1. System signals error to Parking attendant
 2. Parking attendant asks Driver for alternate payment
4. System receives payment approval, signals approval, releasing the cash drawer to store the check
 - 4a. System receives funds not available indication
 1. System signals funds not available to Parking attendant
 2. Parking attendant informs the Driver, asking for alternate payment
 - 4b. Timeout waiting for response
 1. System indicates timeout to Parking attendant
 2. Parking attendant may try again, or ask the Driver for alternate payment
5. System records payment, including the funds available approval

8e. Parking attendant cancels payment step

1. System cancels sale
2. System clears out Driver data
3. System sets up for another sale

10a. Printer out of paper

1. If System can detect the fault, it will signal the problem
2. Parking attendant replaces the paper
3. Parking attendant prints another receipt

Special Requirements

- Credit/check authorization response within 30 seconds 90% of the time

Technology and Data Variations List

- Card originally based on the magnetic “credit card” system: where the card is read similar to a credit card might consider adding a “laser reader” bar code to the card for the possible migration to bar code readers
- Migrate to a “paperless” credit/debit card signature digital capture

Frequency of Occurrence: Could be nearly continuous

Open Issues:

- Is the card tested prior to handing to driver?

Use Case UC2: Process Daily Parking Tickets

Scope: Parking Permit System

Level: Parking Attendant Goal

Primary Actor: Parking Attendant

Stakeholders and Interests:

- Driver: Wants to pay for parking in the Parking Garage
- Parking Attendant: Wants fast accurate entry for process Daily Parking Tickets
- General Manager: Wants to keep track of how many daily parking tickets sold on a timely basis for economic reasons
- University Administrator: Wants to keep track of revenue generated by the sell of daily parking tickets
- Payment Authorization Service: Wants to receive digital authorization requests in the correct format and protocol. Wants to accurately account for their payables to the University

Preconditions: Parking attendant is identified an authenticated

Postconditions: Sale is saved. Receipt is generated. Payment authorization approvals are recorded

Main Success Scenario:

Actor Action	System
<ol style="list-style-type: none">1. Driver arrives at the Parking attendant station to pay for daily parking ticket2. Parking attendant starts a new sale3. Parking attendant enters the ticket number, check in time and current time into the System	<ol style="list-style-type: none">4. Records the ticket number and parking time5. Calculates the amount to charge the driver6. Presents the total of the sale
<ol style="list-style-type: none">7. Driver pays	<ol style="list-style-type: none">8. Handles Payment9. Logs completed sale10. Prints out receipt
<ol style="list-style-type: none">11. Hands receipt to Driver	

Extensions (or Alternative Flows):

*a At anytime, System Fails:

System needs to ensure all previous transactions are saved.

1. The Parking Attendant restarts the system and logs back in (if needed).

8a. Paying by cash:

1. Parking Attendant enters the cash amount tendered
2. System presents the cash due and releases the cash drawer
3. Cashier deposits the cash and returns the balance in cash to the Driver
4. System records the cash payment

8b. Paying by credit:

1. Driver enters the credit information
2. System displays the payment for verification
3. Parking attendant confirms
4. System sends payment authorization request to external Payment Authorization Service, requesting payment approval
 - 4a. System fails to communicate with external system
 1. System signals error to Parking Attendant
 2. Parking attendant asks Driver for alternate payment
5. System receives payment approval, signals approval, releasing the cash drawer to store the signed receipt
 - 5a. System receives payment denial
 1. System signals denial to Parking attendant
 2. Parking attendant informs the Driver, requesting alternate payment
 - 5b. Timeout waiting for the response
 1. System indicates timeout to Parking attendant
 2. Parking attendant may try again or ask driver for alternate payment
6. System records the credit payment, including the payment approval
7. System presents credit payment signature input mechanism
8. Parking attendant asks driver to sign
9. If signature is paper, Parking attendant places the approval printout into the cash drawer.

8c. Paying by Debit:

1. This is similar to the Paying by Credit above (8b), please refer to 8b: Paying by Credit

8d. Paying by Check:

1. Driver hands the check to the Parking attendant
2. Parking attendant enters the check information, including the account and routing numbers
 - 2a. Parking attendant cancels payment step
 1. System cancels sale
 2. System clears out Driver data
 3. System Sets up for another sale
3. System receives payment approval, signals approval, releasing the cash drawer to store the check
 - 4a. System receives funds not available indication
 1. System signals funds not available to Parking attendant
 2. Parking attendant informs the Driver, asking for alternate payment
 - 4b. Timeout waiting for response
 1. System indicates timeout to Parking attendant

2. Parking attendant my try again, or ask the Driver for alternate payment
 4. System sends payment authorization request to external Payment Authorization Service, requesting if funds are available
 - 3a. System fails to communicate with external system
 1. System signals error to Parking attendant
 2. Parking attendant asks Driver for alternate payment
 5. System records payment, including the funds available approval
- 10a. Printer out of paper
1. If the System can detect the fault, it will signal the problem
 2. Parking attendant replaces the paper
 3. Parking attendant prints another receipt

Special Requirements

- Credit/check authorization response within 30 seconds 90% of the time

Technology and Data Variations List

- Migrate to a “paperless” credit/debit card signature digital capture

Frequency of Occurrence: Could be nearly continuous

Open Issues:

- What happens if the driver cannot pay the bill?

Use Case UC3: Park in Garage

Scope: Parking Permit System

Level: Driver Goal

Primary Actor: Driver

Stakeholders and Interests:

- Driver: Wants to park
- General Manager: Wants to keep track of how many cars are parked in the garage.

Preconditions: The Parking System is running. The Parking Card Readers are running, communicating with the Parking System. The daily parking ticket dispenser is running, communicating with the Parking System.

Postconditions: The Driver is in the Garage. The System removes one more parking space from the spaces available

Main Success Scenario:

Actor Action	System
<ol style="list-style-type: none"> 1. Driver shows up at the Parking Garage entrance. 2. Driver Swipes Annual parking permit card 	

<p>into the card reader or Driver Obtains a Daily Parking Ticket from the dispenser</p> <p>5. Driver pulls into the Parking Garage and parks</p>	<p>3. Records the permit information, the time of entry and removes one parking slot from the number available in the Parking Garage.</p> <p>4. Sends a signal the entrance gate to open.</p>
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Extensions (or Alternative Flows):

3a. The Driver takes the last available parking slot

1. System signals the all the entrance gates in the Parking Garage state of the lot is full
2. The entrance gates display the “Lot Full” sign
3. System signals the General Manager the lot is full indicating the time the lot became full

3b. The Yearly Parking Permit Reader stops working

1. The Driver informs the Parking Attendant of the problem. The Parking Attendant informs the Driver to try another entrance.

3c. The Daily Permit Dispenser stops working

1. The Driver informs the Parking Attendant of the problem. The Parking Attendant informs the Driver to try another entrance
2. The Parking attendant fills the dispenser with new tickets

Special Requirements:

- The annual Permit Card Readers need to be all weather
- The System needs to have authentication response within .1 sec of receiving the “park request”
- The System needs to be able to handle multiple gates nearly simultaneously
- The System needs to update the number of stalls available within .1 sec of reserving a spot for another driver
- The System needs to inform the gates of a “lot full” state (if needed) with .1 sec of the lot becoming full so the “Lot Full” signs can light and no Driver is misled

Technology and Data Variations List

- Possible migration to laser bar code readers to use for annual permits: this means that annual permits contain both the magnetic “credit card” strip as well as the bar code system

Frequency of Occurrence: Could be nearly continuous

Open Issues:

- Reserved spots for Yearly card holders?
- Assigned spots for drivers entering the lot?
- Should the System keep track of the number of tickets in the daily parking ticket dispensers?

Use Case U4: Exit Garage

Scope: Parking Permit System

Level: Driver Goal

Primary Actor: Driver

Stakeholders and Interests:

- Driver: Wants to leave with car
- General Manager: Wants to see how many parking stalls are open in the Garage

Preconditions: The Parking System is running. The Parking Card Readers are running, communicating with the Parking System.

Postconditions: The Driver exits the garage. The System adds one more parking space to spaces available.

Main Success Scenario:

Actor Action	System
<ol style="list-style-type: none">1. Driver exits the parking garage by either swiping the annual Parking permit card into the card reader or by paying the Parking Attendant (see <u>Use Case U2: Process Daily Parking Tickets</u>)5. Driver pulls out of the Parking Garage	<ol style="list-style-type: none">2. Records the permit information, the time of exit and adds one more parking slot to the number of available in the Parking Garage.3. Sends a signal to the exit gate to open.

Extensions (or Alternative Flows):

2a. The Driver opens the last available parking slot

1. System signals all the entrance gates in the Parking Garage the state of the lot is not full.
2. The entrance gates stop displaying the “Lot Full” sign
3. System signals the General Manager the lot is no longer full indicating the time a stall in the lot became available

2b. The Exit Card Reader for the Yearly Parking Permit Reader stops working

1. The Driver informs the Parking Attendant of the problem. The Parking Attendant informs the Driver to use another exit.

Special Requirements:

- The annual Permit Card Readers need to be all weather
- The System needs to have authentication response within .1 sec of receiving the “park request”
- The System needs to be able to handle multiple gates nearly simultaneously
- The System needs to update the number of stalls available within .1 sec of reserving a spot for another driver

- The System needs to inform the gates of the “lot open” state within .1 sec of the lot becoming open so as to allow other Drivers the opportunity to park in the lot.

Technology and Data Variations List:

- Possible migration to laser bar code readers to use for annual permits: this means that annual permits contain both the magnetic “credit card” strip as well as the bar code system

Frequency of Occurrence: Could be nearly continuous

Open Issues:

- How many exits?
- How to handle the exiting of the Daily Parking Permit user? Only one exit available--the one with the parking attendant—so they can pay the Parking attendant directly, placing the Parking Attendant at one exit? Are they issued a “one time exit card”--where the Driver can swipe that card at any exit?

Use Case UC5: Set Parking Rates

Scope: Parking Permit System

Level: General Manager Goal

Primary Actor: General Manager

Stakeholders and Interests:

- General Manager: Wants to maximize the amount of income based on the Law of Supply and Demand
- University Administrator: Wants to maintain a steady stream of revenue for the University to pay for the Parking Garage as well as a means to provide income for other University interests

Preconditions: The Parking System is running.

Postconditions: The Parking rates are set based on hourly demand on a daily basis.

Main Success Scenario:

Actor Action	System
1. General Manager requests current Parking Garage Usage Statistics for a given day, hour, year, peak hour usage	2. Returns the requested statistics
3. General Manager sets the hourly rate based on the Statistics provided by the System	4. Sets the new hourly rates to charge the customers at the current time.

Extensions (or Alternative Flows):

2a. If there is a rate change while a Driver is parked in the garage

1. The System keeps track of the amount of time the Driver was in the Parking Garage for the

given rate: charging the Driver at that rate for that time

- 2b. If the General Manager is not available to change the rate (off peak hours, weekends, vacations)
1. The System sets the rate based on “default” rates for a given time as entered by the General Manager
 2. The System may contain several “default” rates
 1. Peak
 2. Off Hours
 3. Holidays and Weekends

Special Requirements: N/A

Technology and Data Variations List:

- Possibly derive parking rates based on formulation which means migration to peak hours parking rate algorithm to be implemented in the system.

Frequency of Occurrence: Based on how often the Parking Garage is monitored.

Open Issues:

- Explore the possibility of implementing a “demand based” algorithm in the Parking System which will monitor the Parking Garage capacity and automatically set the parking rates. The System will allow the General Manager to choose to either “automate” the the Parking rate based on capacity or manually set the rate.