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| **User Case Name: reserve a plane** | **ID 1** | | **IM Level**: high |
| **Primary Actor**: customer | | **User Case Type**: detail, essential | |
| **Stakeholders and Interests**:  Customer - create, update, cancel a rental reservation  Instructor – ensure customer get consult on schedule  Admin – ensure customer get rental plane on schedule | | | |
| **Brief Description**: this user case depicts how customers reserve a plane as well as update or cancel a plan rental service | | | |
| **Trigger**: customer login the system to request rental service or update/ cancel a rental service  **Type**: aggregation | | | |
| **Precondition:**   1. customer already has an account with essential information 2. plane and instructor essential information 3. plane sand instructor schedule | | | |
| **Relationships**:  Association: customer  Include: manage reservation, verify qualification  Extend: reserve instructor  Generalization: | | | |
| **Normal Flow of Events**:   1. customer logins the system regarding the rental thoughts(or call system admin, then system admin would play a role as customer) 2. customer chooses the plane model regarding his qualification: S-1 verify qualification 3. customer chooses rental day regarding plane schedule: S-2 manage reservation 4. if customer asks for an instructor, he needs to choose instructor from available instructors list: S-3 reserve instructor 5. customer can update or cancel the rental reservation   if update a rental reservation: S-2-1 needs match with plane and instructor schedules, and update their schedule as well.  if cancel a rental reservation: S-2-2 needs notice admin and instructor and update their schedule | | | |
| **SubFlows**:  S-1: verify qualification (need to be discussed with stakeholders)   1. base on customer’s FAA certification, customer can only fly a group of planes which matches his category. 2. base on customer’s training history of high performance plane, customer would play a plane over 200 horsepower.   S-2: manage reservation (User Description ID=2)  S-3: reserve instructor   1. according to the plane reservation date, customer can find all the instructors available that day. 2. Customer choose the instructor | | | |
| **Alternate/Exceptional Flows**:  S-1a: if customer prefer a high-performance plane, he needs to join a ground and flight training  S-3a: if there is no instructor available on chosen date, customer needs to change plane date or give up reserve coaching service. | | | |

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| **User Case Name: manage rental reservation** | **ID 2** | | **IM Level**: high |
| **Primary Actor**: customer, system admin | | **User Case Type**: detail, essential | |
| **Stakeholders and Interests**:  Customer – schedule or cancel a reservation  Instructor – change instructor schedule may affect current reservation  Admin – change plane schedule may affect current reservation or admin cancels reservation directly | | | |
| **Brief Description**: this user case depicts how user or system admin manages a rental reservation; and how the changes within the plane or instructor schedules lead to updating customer reservation. | | | |
| **Trigger**: customer/admin changes the rental date; customer/admin cancel a rental; plane or instructor schedule changed by admin or instructor;  **Type**: included or extended | | | |
| **Precondition:**   1. a reservation already exists 2. plane or instructor changes the date which already had been reserved | | | |
| **Relationships**:  Association: reserve a plane, manage plane schedule, manage instructor schedule, system admin  Include:  Extend:  Generalization: | | | |
| **Normal Flow of Events**:   1. customer reserve a plane (User Description ID=1) 2. plane and instructor schedule marked reserved on the flight date 3. customer reschedule a plan: S-1 reschedule a plan 4. customer/admin cancel a plan: S-2 cancel a reservation 5. system admin changes plane schedule or instructor changes his schedule   if changed date is reserved by customer, the original reservation will be canceled, and customer will receive a notification.   1. after a success flight, system admin will know this rental event is completed. | | | |
| **SubFlows**:  S-1 reschedule a plan   1. customer choose plane and date with instructor 2. customer make a new rental reservation (User Description ID=1) 3. plane and instructor are available on the previous reserved date   S-2 cancel a reservation   1. customer or system admin find an existing reservation 2. customer or system admin cancel the existing reservation 3. plane and instructor are available on the previous reserved date | | | |
| **Alternate/Exceptional Flows**:  S-1a: if customer fails to reschedule due to no plane or instructor available, customer can only keep or cancel original plan. | | | |

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| **User Case Name: manage a rental billing** | **ID 3** | | **IM Level**: high |
| **Primary Actor**: system admin | | **User Case Type**: detail, essential | |
| **Stakeholders and Interests**:  Admin – calculate the bill for each order and create invoice  Customer – pay bill and receive invoice | | | |
| **Brief Description**: this user case depicts how system admin calculate the bill and create invoice after a(or more) successful plane rental | | | |
| **Trigger**: customer completes a order activities which includes one or more flights, and records all the flights hobbs into system by system admin.  **Type**: aggregation | | | |
| **Precondition:**   1. all the flights in an order have been completed 2. customer or system admin cancels order | | | |
| **Relationships**:  Association: system admin  Include: record time, produce invoice  Extend:  Generalization: | | | |
| **Normal Flow of Events**:   1. after each successful flight, customer submits his flight hobb to admin 2. admin records the hobb and calculate the total price for each rental. S-1 3. after all rental completed in an order, create the bill and invoice. S-2 4. send the bill and invoice to customer 5. customer pay the bill, and the bill marked paid | | | |
| **SubFlows**:  S-1 record hobbs time   1. before/after each flight, customer writes down the start time and end time 2. customer submits the time record to admin, admin records it into system 3. each total price equals hobbs time \* unite price 4. after all events in an order completed, all total price all be summarized to get a bill price for a customer   S-2 create invoice   1. admin or system gets the detail items for each flight 2. admin or system gets customer business information 3. create invoice(s) for an completed order | | | |
| **Alternate/Exceptional Flows**:  S-2a: customer maybe don’t want invoice, then S-2 will be skipped | | | |