Phase 1 Report | CS6400 - Fall 2017 | Team 008

Group of

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Table of Content

(1) Data Types
(2) Constraints (Business Logic Constraints)
(3) Task Decomposition (TD) with Abstract Code (AC)

- Login
- Registration
- Customer Main Menu
- View Profile
- Check Tool Availability
- Make Reservation
- Purchase Tool
- Clerk Main Menu
- Pick-up Reservation
- Drop-off Reservation
- Add Tool
- Repair Tool
- View Service Status
- Sell Tool
- View Sale Status
- Generate Reports

(1) Data Types

User:

Attribute	Data type	Allow Null
UserName	String	Not Null
Email	String	Not Null
Password	String	Not Null
FirstName	String	Not Null
MiddleName	String	Not Null
LastName	String	Not Null

Customer:

Attribute	Data type	Allow Null
PrimaryPhone	String	Not Null
CellPhone	String	Null
HomePhone	String	Null
WorkPhone	String	Null
Address	String	Not Null
CreditCard#	String	Not Null
Name-on-Card	String	Not Null
ExpirationDate	Date	Not Null
CVC #	int	Not Null

Clerk:

Attribute	Data type	Allow Null
DateOfHired	Date	Not Null
EmployeeNumber	int	Not Null

Reservation:

Attribute	**Data type**	**Allow Null**
StartDate	Date	Not Null
EndDate	Date	Not Null

Tool:

Attribute	**Data type**	**Allow Null**
PurchasePrice	int	Not Null
DepositPrice	Float	Null
SellPrice	Float	Null
RentalPrice	Float	Null
ToolNumber	int	Not Null
Manufacture	String	Not Null
Material	String	Null
PowerSource	String	Not Null
Width/Diameter	Float	Not Null
Length	Float	Not Null
Weight	Float	Not Null
Full_Description	String	Null

PowerTools:

Attribute	**Data type**	**Allow Null**
Quantity	int	Not Null
AccessoryName	String	Not Null

(2) Business Logic Constraints

Customer User:

- Customers who are new to Tools-4-Rent must register first.
- Customers who have an existing Tools-4-Rent account will not be able to register.
- Customers must enter the following information: username, email address, full name (first, middle, last), and at least one phone number from home phone, work phone, and cell phone and phone number must contain separate fields: area code, phone number, extension
- Customers must declare one of the phone numbers as their primary phone numbers.
- Customers must have a credit card on file: customers must enter the credit card number, name on card, expiration month, expiration year, CVC 3-digit number.
- Customers are allowed to have only one single Address which contains: street, city, state, 9-digit zip code plus the hyphen '-'.
- Customers log in Tools-4-Rent and could select **View Profile** Task, **Check Tool Availability** Task, **Make Reservation** Task, **Purchase Tool** Task and **Exit** Task from Customer Main Menu.
- Customers are allowed to rent no more than ten tools per reservation once they select Make Reservation Task.
- Customers are given error messages of a specific tool available inventory reaches zero and if an identical tool requested is due to return within the next 24 hours form the time of the request, customers are given notices telling them the date/time when that tool is expected to become available.
- Customers' pending tool reservation, pending tool purchase do not guarantee availability until they are confirmed.
- Customers cannot purchase tool which is not in the Available Tools to Purchase List.

Clerk User:

- Clerks username, email, temporary password, employee number, and date-of-hire must be entered into the system by the System Administrator.
- Clerks must enter a new password twice when the first time the clerks have logged in using temporary password.
- Clerks are not able to login as Customers.
- Clerks log in Tools-4-Rent and could select **Pick-Up Reservation** Task, **Drop-Off Reservation** Task, **Add New Tool** Task, **Service Order** Task, **Service Status** Task, **Sell Tool** Task, **Sale Status** Task, **Generate Reports** Task, **Logout** Task from Clerk Main Menu.
- Clerks must enter Purchase Price of tool once they add new tools to the inventory.
- Clerks must enter new tools information in order: select Type -> select Sub-Type -> select Sub-Option.
- Clerks cannot enter a duplicate repair service request on the same tool (even in the future).
- Clerks can manually change the current status of all tools in repair.
- Clerks can manually mark a tool 'for sale'.

- Clerks are responsible for generating Clerk Report, Customer Report and Tool Inventory Report monthly.

Tool:

- There are 4 types of tools available for rental: Hand Tools, Garden Tools, Ladder and Power Tools.
- Tools are also described by 4 power sources: A/C electric, D/C cordless, gas-powered and manual. Each tool is further described by a sub-option. A/C voltage choice include: 110V, 120V, 220V and 240V.
- Some Power Tool *sub-types* may have multiple power-sources. Each *tool instance* (regardless of type) will only run on a single power source.
- Power Tools may run only on: gas, electric, or cordless power sources.
- Each instance of tool will have a unique 'tool-number'.
- More than one instance of the same tool may exist in the database with same/similar short-descriptions.
- Tool accessories are unique to Power Tools and each power tool may have zero or more than one accessory.
- Tool Rental Price is 15% of the original Purchase Price (entered by Clerk), Tool Deposit Price is 40% of the original Purchase Price.
- Tools are automatically marked 'for-sale' by the system once they are rented 50 times.
- Tool Sale Price is 50% of the original Purchase Price.
- In repair tool is automatically added back to the 'available' inventory once the end date of services passes midnight or if the Clerk hits the *fix now* button.

(3) Task Decomposition

For each one of the tasks identified in the IFD, we need to figure out if it's a single task or it needs to be decomposed. There are several rules of thumb:

- Lookup task or is it a modification to the database (update/insert/delete)?
  - If many actions take place, the task may need to be decomposed.
- How many schema constructs are involved?
  - If a large number of schema constructs are involved, the task need to be decomposed into smaller tasks using smaller portions of the database
- Are enabling conditions consistent across tasks?
  - If some portions are enabled, run them, instead of waiting when the entire thing can run – the resources may not be available!
- Are frequencies consistent across tasks?
  - If the tasks contain actions that are done with a high frequency and actions that have a low frequency, split them up
  - High frequency request may need an index to speed them up
  - Low frequency requests may not need indexing
- Is consistency essential?
- Is mother task control needed or not?

Based on rules of thumb and our IFD design, our task decomposition and abstract code are designed as below:

Login

Task Decomposition
Lock Types: Read-only on User
Number of Locks: Single
Enabling Conditions: None
Frequency: NA
Consistency (ACID): not critical, order is not critical
Subtasks: Mother Task is not needed. No decomposition needed

Abstract Code

- User enters *username* and *password* into input fields
- User selects ***Customer*** or ***Clerk*** radio button
- When ***Sign-in*** button is clicked:
  - If *username* is found but *password* is incorrect:
    - Go back to **Login** form, with error message.
  - Else if username is not found for ***Customer*** or ***Clerk***:
    - If it is the ***Customer***:
      - Go to the **Customer Registration form** to create a new profile
    - Else
      - Go back to **Login** form, with error message
  - Else if *username* and *password* combination is found:

- Login the user into main menu.

Registration

Abstract Code

- User enters *First Name, Middle Name, Last Name, Home Phone, Work Phone, Cell Phone* into input fields.
- User selects either ***Home Phone, Work Phone*** or ***Cell Phone*** radio button as *Primary Phone*.
- User enters *Email Address, Password, re-type Password, Street Address, City, Zip Code* into input fields and selects a *state* from the drop-down list.
- User inputs *Name on Credit Card, Credit Card #* into input fields
- User selects *Expiration Month* and *Expiration Year* from drop-down list

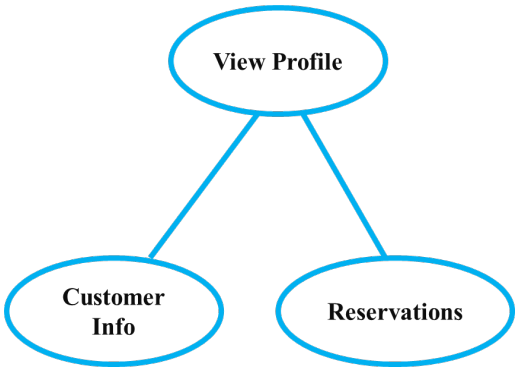
Customer Main Menu

Abstract Code

- Show "***View Profile***", "***Check Tool Availability***", "***Make Reservation***", "***Purchase Tool***", and "***Exit***" tabs.
- Upon:
  - Click ***View Profile*** button – Jump to the **View Profile** task.
  - Click ***Check Tool Availability*** button – Jump to the **Check Tool Availability** task.
  - Click ***Make Reservation*** button – Jump to the **Make Reservation** task**.**
  - Click ***Purchase Tool*** button – Jump to the **Purchase Tool** task.
  - Click ***Exit*** button – Invalidate login session and go back to the **Login** form.

View Profile

Task Decomposition



Lock Types: 2 read-only lookups of Customer Information and Reservations for a Customer
Number of Locks: Several different schema constructs are needed
Enabling Conditions: All 2 are enabled by a customer's login
Frequency: Low – All 2 have the same frequency
Consistency (ACID): is not critical
Subtasks: All tasks must be done, so a mother task is needed

Abstract Code

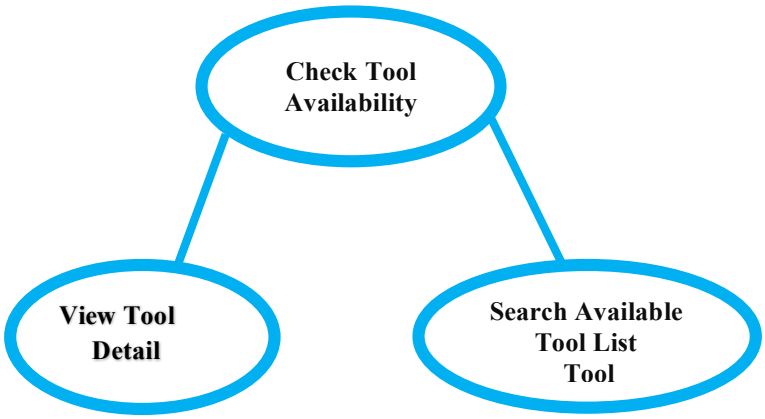
- User clicked on ***View Profile*** button from **Main Menu**:

- Run the **View Profile** task: query for information about the customer and their profile where #CustomerID is the ID of the current customer using the system from the HTTP Session/Cookie.
    - Find the current Customer using the Customer email; Display Customer Email, Full Name, Home Phone, Work Phone, Cell Phone and address.
    - Find reservations for the Customer:

      Display the rental history lists the summaries for all reservations made, including Reservation ID, Tools, Start Date, End Date, names of pickup clerk, and etc.

Check Tool Availability

Task Decomposition



Lock Types: Lookups of Available Tool List, Tool Detail information (read-only)
Number of Locks: Several schema constructs are needed.
Enabling Conditions: All these are enabled by a customer's login and separate Check Tool Availability request from customer main menu.
Frequency: Sub tasks have different frequencies.
Consistency (ACID): consistency is not critical, even if the profile is being searched by the user while another user is looking at it.
Subtasks: Mother task is required to coordinate subtasks. Order is necessary.

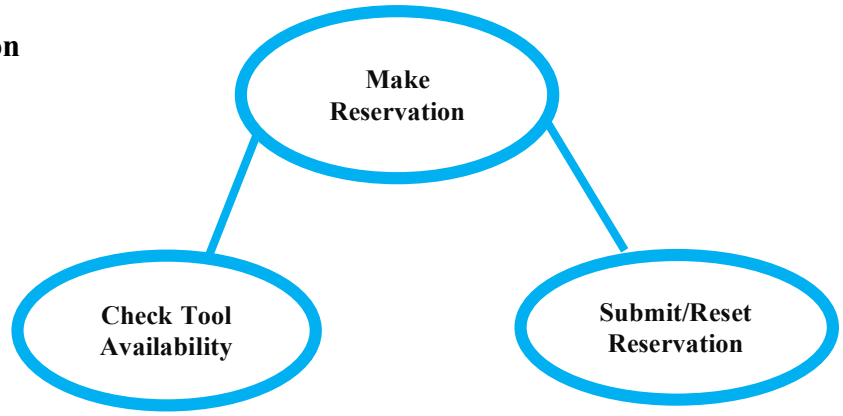
Abstract Code

- Customer clicks on ***Check Tool Availability*** button from **Customer Main Menu**:
- Run the **Check Tool Availability** task: query for information about the available tool list where ToolID is the ID of the available tool using the system from the HTTP Session/Cookie.
    - Find the available **Tool** using any combination of *start/end dates*, *tool category*, *power-source/sub-types*, and/or *keyword search* and clicking ***Search*** button; Display unique Tool ID, a Short-Description, Deposit price/ Reservation required and Rental Price/Day.
    - Find the Tool Details by clicking on a link under Tool Description; Display full description: Tool ID, Tool Type, Short Description, Full Description, Deposit Price, Rental Price.

When ready, customer selects next action from choices in **Customer Main Menu**.

Make Reservation

Task Decomposition



Lock Types: Lookups of Available Tools For Rent, Tool Detail, Tools Added to Reservation, Reservation Summary information and Reservation Confirmation information (read-only)
Insert reservation information, delete reservation information
Need to get information before Make Reservation, simply re-use the Check Tool Availability task already created.
Number of Locks: Several different schema constructs are needed.
Enabling Conditions: All these are enabled by a customer's login and separate make reservation request from customer main menu.
Frequency: Make Reservation Frequency: it is expected that the system will handle about 200 reservations per day.
Sub tasks have different frequencies.
Consistency (ACID): consistency is critical for this task since concurrency needs to be considered
Subtasks: Mother task is required to coordinate subtasks. Order is necessary.

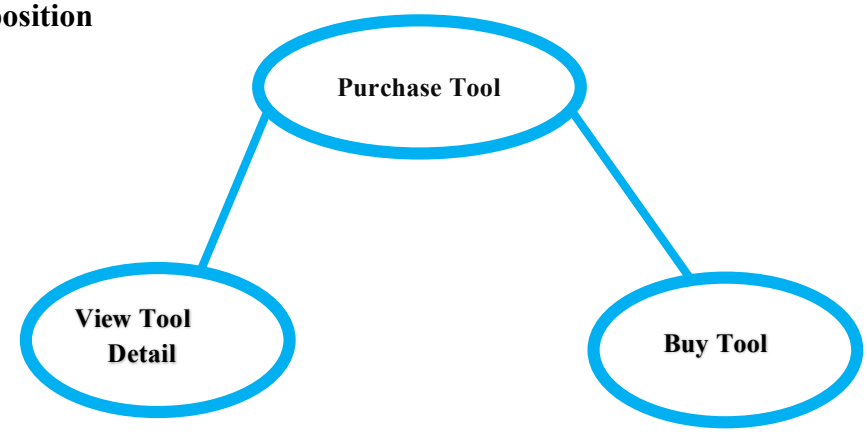
Abstract Code

- Customer clicks on ***Make Reservation*** button from **Customer Main Menu:**
- Run the **Make Reservation** task: query for information about the available tool list where ToolID is the ID of the available tool using the system from the HTTP Session/Cookie.
    - Find the available Tool using any combination of *start/end dates*, *tool category*, *power-source/sub-types*, and/or *keyword search* and clicking ***Search*** button; Display unique Tool ID, a Short-Description, Deposit price/Reservation required and Rental Price/Day.
    - If customer decides which tool to rent, customer clicks ***Add*** Checkbox; Display Tools Added to Reservation: Tool ID, Description, Rental Price, Deposit Price.
    - If customer wants to remove the tools he/she selected, customer clicks ***Remove*** Checkbox; Display Tools Added to Reservation: Tool ID, Description, Rental Price, Deposit Price.
    - Find the Total Rent Price by clicking ***Calculate Total*** button; Display Reservation Summary: Reservation Start and End Dates, Number of Days Rented, Total Deposit Price, Total Rental Price, Tool ID, a Short-Description, Deposit Price/Reservation, Rental Price/Reservation, Totals.

- When ready, customer clicks ***Submit*** button to submit the reservation; Display Reservation Confirmation: Reservation ID, Reservation Start and End Dates, Number of Days Rented, Total Deposit Price, Total Rental Price, Tool ID, a Short-Description, Deposit Price/Reservation, Rental Price/Reservation, Totals.
- If customer wants to print the Reservation Confirmation, customer clicks ***Print*** button.
- If customer wants to cancel the reservation, customer clicks ***Reset*** button and go back to the **Make Reservation** form.

Purchase Tool

Task Decomposition



Lock Types: Lookups of Available Tools to Purchase, Tool Detail, Purchase Summary, Purchase Confirmation information (read-only)
Insert purchase information, delete purchase information
Insert credit card information, delete credit card information
Number of Locks: Several schema constructs are needed.
Enabling Conditions: All these are enabled by a customer's login and separate purchase tool request from customer main menu.
Frequency: Sub tasks have different frequencies.
Consistency (ACID): consistency is critical for this task since concurrency needs to be considered
Subtasks: Mother task is required to coordinate subtasks. Order is necessary.

Abstract Code

- Customer clicks on ***Purchase Tool*** button from **Customer Main Menu**:
- Run the **Purchase Tool** task: query for information about the available tool to purchase list where $ToolID is the ID of tool using the system from the HTTP Session/Cookie.
  - Restrict the sale Tool using any combination of *tool category*, *power-source/sub-types*, and/or *keyword search*; Display unique Tool ID, Current Status, a Short-description, Purchase Price.
  - If customer wants to purchase tool, click ***Purchase Tool*** button; Display Purchase Summary: Purchase ID, Purchase Date, Total Purchase Price, **Credit card Information** form, Tool ID, a Short-Description, Purchase Price, Totals.

- Customer could either use credit card on file or if the customer wants to use a new card, the customer is prompted to enter the *new credit card number*, *name on card*, *expiration month*, *expiration year*, *CVC 3-digit number*.
- When ready, customer clicks ***Submit*** button to submit the purchase; Display Purchase Confirmation: Purchase ID, Purchase Date, Total Purchase Price, Tool ID, a Short-Description, Deposit Price/Reservation, Rental Price/Reservation, Total Price/Reservation.
- If customer wants to cancel the purchase, customer clicks ***Reset*** button and go back to the **Purchase Tool** form.
- If customer wants to print the Reservation Confirmation, customer clicks ***Print*** button.
- If customer wants to cancel the purchase, click ***Reset*** button and go back to the **Purchase Tool** form.

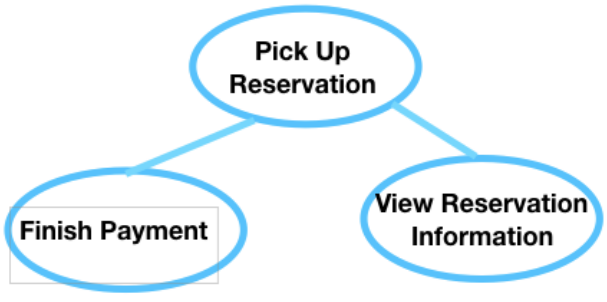
Clerk Main Menu

Abstract Code

- Show "***Pick-Up Reservation***", "***Drop-off Reservation***", "***Add New Tool***", "***Service Order***", "***Service Status***", "***Sell Tool***", "***Sale Status***", "***Generate Reports***", and "***Logout***" tabs.
- Upon:
  - Click ***Pick-Up Reservation*** button – Jump to the **Pick-Up Reservation** task.
  - Click ***Drop-off Reservation*** button – Jump to the **Drop-off Reservation** task.
  - Click ***Add New Tool*** button – Jump to the **Add New Tool** task.
  - Click ***Service Order*** button – Jump to the **Service Order** task.
  - Click ***Service Status*** button – Jump to the **Service Status** task.
  - Click ***Sell Tool*** button – Jump to the **Sell Tool** task.
  - Click ***Sale Status*** button – Jump to the **Sale Status** task.
  - Click ***Generate Reports*** button – Jump to the **Generate Reports** task.
  - Click ***Logout*** button – Invalidate login session and go back to the **Login** form.

Pick Up Reservations

Task Decomposition



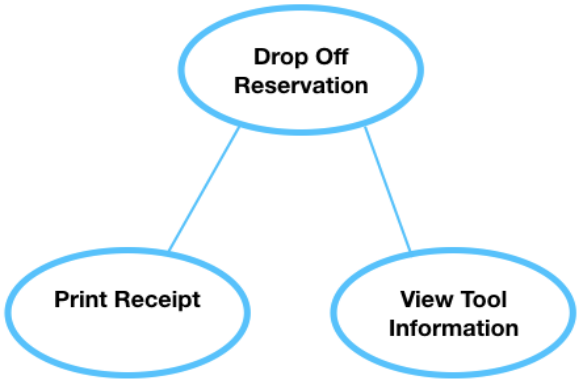
Lock Types: **1 Read/Write for enter payment information 1 read only for view reservation information for a Clerk User.**

Number of Locks: Several different schema constructs are needed.
Enabling Conditions: Both are enabled by select pick up reservation task.
Frequency: We estimate there will be around 200 pick ups per day. The frequency of sub tasks are Different
Consistency(ACID): Important. Only can be seen by Customer User after the adding information is finished.
Subtasks: Mother Task is needed, Only Clerk User can view the reservation information.

Abstract Code
PickUpReservation

- Clerk User clicks on ***Pick-Up Reservation*** button from **Clerk Main Menu:**
- Clerk User clicks the reservation ID to view the reservation information
- Clerk User enters the reservation ID and click the ***Pick Up*** button.
- Clerk User clicks the payment option category with two radio buttons: ***Existing*** and ***New***.
    - If ***Existing*** is selected
        - Fields including *Name on Credit Card*, *Credit Card #, CVC, Expiration Month and Expiration Year*(drop-down menus for *Expiration Month and Expiration Year*) were inputed automatically
        - Clerk User click the confirm ***Pick Up*** button.
    - If ***New*** is selected:
        - Clerk User inputs *Name on Credit Card*, *Credit Card #, CVC, Expiration Month and Expiration Year*(drop-down menus for *Expiration Month and Expiration Year*) into input fields.
        - Clerk User click the confirm ***Pick Up*** button.When all required fields are filled, clerk clicks on ***Confirm*** button to add new tool with description into database.
- Clerk User clicks the ***Print Contract*** button to print the contract information.
- Clerk User clicks the tool's name to view the tool information

Drop Off Reservation
Task Decomposition

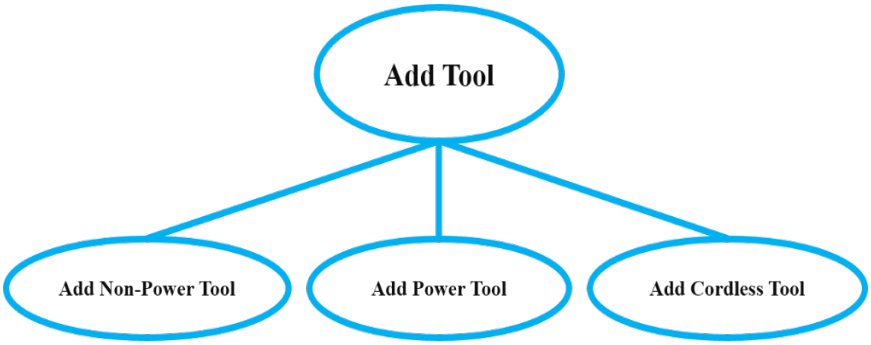


Lock Types: Both View Tool information and final receipt are read-only for Clerk User. Drop Off reservation is read/write for Clerk User.
Number of Locks: Several different schemas are needed
Enabling Conditions: "Final Receipt" and "View Tool Information" are enabled by a clerk's Drop Off Reservation task.
Frequency: We estimate there will be around 200 pick ups per day. The frequency of sub tasks are Different
Consistency(ACID): Important.
Subtasks: **Mother Task is needed. Only clerk user can see the final receipt page.**

Abstract Code
DropOffReservation

- Clerk User clicks on ***Drop-Off Reservation*** button from **Clerk Main Menu:**
- Run the **DropOffReservation** task:
  - Clerk User inputs Reservation ID.
  - Clerk User clicks ***Drop-Off*** button, find the corresponding reservation; Display the Tool ID, Tool Name, Deposit Price, Rental Price and Total.
- Clerk User clicks ***Drop-Off*** button, print out the receipt.
- Clerk User clicks the tool's name to view the tool information

Add Tool
Task Decomposition



Lock Types: 3 write-only adding description information of Non-Power Tool (Hand Tool, Ladder, Garden Tool), Power Tool and Cordless Tool for a Clerk User.
Number of Locks: Several different schema constructs are needed.
Enabling Conditions: All 3 are enabled by a clerk's Login and clicks ***Add New Tool*** button.
Frequency: 10x per week – 3 subtasks have different frequencies.
Consistency(ACID): Important. Only can be seen by customer users after the adding information is finished.
Subtasks: According to the actual description, all the tools are existed, therefore all subtasks must be done, so a mother task is needed.

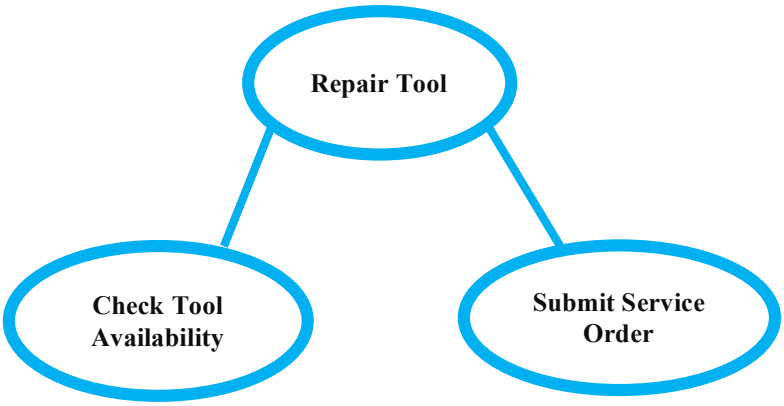
Abstract Code

Add Tool

- Clerk User clicks on ***Add New Tool*** button from **Clerk Main Menu:**
- Run the **Add Tool** task: clerk chooses the tool category with four radio buttons: ***Hand Tool***, ***Garden Tool***, ***Ladder***, and ***Power Tool***.
    - If ***Hand Tool*** OR ***Ladder*** OR ***Garden Tool*** (Non-power Tool) is selected:
        - Clerk User chooses the *Sub-Type* by a drop-down menu.
            - Clerk User chooses the *Sub-Option* by a drop-down menu with dynamically determined choices according the *Sub-Type*.
        - Clerk User inputs *Purchase Price*, *Manufacturer*, *Width* (drop-down menus for *Width Fraction* and *Width Unit*), *Length* (drop-down menus for *Length Fraction* and *Length Unit*), *Weight* and *Drive/Chuck Size* (disabled) into input fields.
    - If ***Power Tool*** is selected:
        - Clerk User chooses the *Power Source* by a drop-down menu.
            - Adding extra input fields where clerk inputs *A/C Volt Rating*, *Power Generated (Power Fraction, Power Unit)*, *Pressure Min (psi)*, *Pressure Max (psi)*, *Gauge Unit (Gun)*, *Capacity Unit (Gun)*, *Amp Rating*, *Torque Min (ft-lb)*, *Torque Max (ft-lb)*, *Speed Min (RPM)*, *Speed Max (RPM)*.
            - Adding extra input fields for *Power Tool Accessory* where the Clerk User inputs *Accessory Quantity* and *Accessory Description*. Clerk User clicks ***Add Accessory*** button to temporary save Tool Accessary information.
            - If **Cordless Tool** is selected: adding extra input fields where clerk inputs *Battery Type* (drop-down menu), *Battery Quantity*, and *D/C Volt Rating (7.2 – 80.0 Volts)*.
        - Clerk User chooses the *Sub-Type* by a drop-down menu.
            - Clerk User chooses the *Sub-Option* by a drop-down menu with dynamically determined choices according the *Sub-Type*.
        - Clerk User inputs *Purchase Price*, *Manufacturer*, *Width* (drop-down menus for *Width Fraction* and *Width Unit*), *Length Width* (drop-down menus for *Length Fraction* and *Length Unit*), *Weight* and *Drive/Chuck Size* into input fields.
    - When all required fields are filled, Clerk User clicks on ***Confirm*** button to add new tool with description into database.

Repair Tool

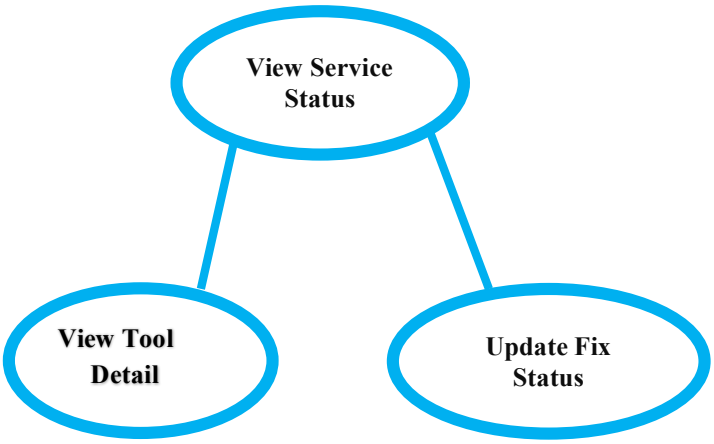
Task Decomposition



Lock Types: Lookup of Available Tool list, Tool Details (read-only)
Insert/delete Tool ID in repair, Service Cost, Service Start Date, Service End Date
Need to get information before make a reservation, simply re-use thee Check Tool Availability task already created.
Number of Locks: Several different schema constructs are needed.
Enabling Conditions: All these are enabled by a clerk's login and separate repair tool request from clerk main menu.
Frequency: Sub tasks have different frequencies.
Consistency (ACID): consistency is critical for this task since concurrency needs to be considered
Subtasks: Mother task is not required to coordinate subtasks. Order is necessary.**Abstract Code**

- Clerk clicks on ***Service Order*** button from **Clerk Main Menu**.
- Run the **Repair Tool** task: query for information about the available tool list where $ToolID is the ID of the available tool using the system from the HTTP Session/Cookie.
    - Find the available **Tool** using any combination of *start/end dates*, *tool category*, *power-source/sub-types*, and/or *keyword search* and clicking ***Search*** button; Display unique Tool ID, a Short-Description, Deposit price/ Reservation required and Rental Price/Day.
    - If clerk wants to order service, click ***Service Tool*** button; Display Tool ID needs to be serviced.
    - Clerk enters *Service Cost*, *Service Start Date*, *Service End Date*, when ready, customer clicks ***Confirm*** button; Display Service ID and summary of service information: Tool ID, a Short-Description, Service Cost, Service Start Date, Service End Date.

View Service Status
Task Decomposition



Lock Types: Lookups of Tools In-Repair list, Tool Detail (read-only)
Update Tool in Repair
Number of Locks: Several different schema constructs are needed.
Enabling Conditions: All these are enabled by a clerk's login and separate Service Status request from clerk main menu
Frequency: Sub tasks have different frequencies.
Consistency (ACID): consistency is critical for this task since concurrency needs to be considered
Subtasks: Mother task is required to coordinate subtasks. Order is not necessary.

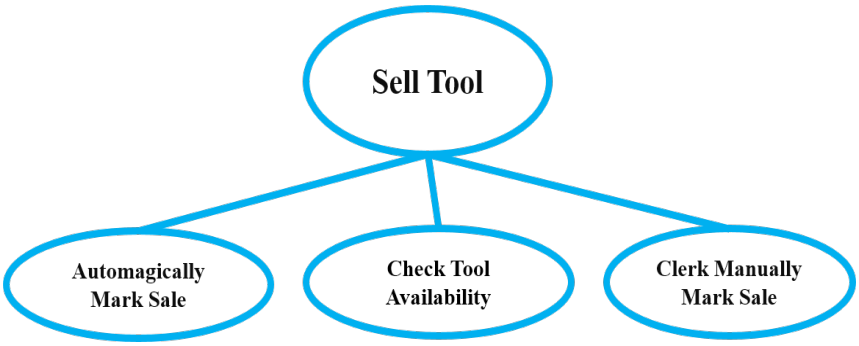
Abstract Code

- Clerk clicks on ***Service Status*** tab from **Clerk Main Menu**.
- Run the **View Service** task: query for information about the Tools In-Repair list where $ToolID is the ID of the Tool in repair using the system from the HTTP Session/Cookie.
    - Restrict the **Tool** in repair result using any combination of *clerk username*, *repair start/end dates*, *repair cost*, *tool category*, *power-source/sub-types*, and/or *keyword search*; Display service ID, Current Status, Tool ID, a Short-Description, Start Date, End Date, Repair Cost, Clerk Username.
    - If clerk wants to update service status, clicks ***Fix Now*** button.

When ready, clerk selects next action from choices in **Clerk Main Menu**.

Sell Tool

Task Decomposition



Lock Types: 'Automatically Mark Sale' is write-only, 'Check Tool Availability' is read-only, and 'Clerk Manually Mark Sale' is write-only for Clerk User.
Number of Locks: Three different schema constructs are needed.
Enabling Conditions: 'Automatically Mark Sale' is enabled when tools are rented 50 times; 'Check Tool Availability' and 'Clerk Manually Mark Sale' are enabled by a clerk's Login and clicks ***Sell Tool*** button.
Frequency: 10x per week – 3 subtasks have different frequencies.
Consistency(ACID): Important. Only can be seen by customer users in the 'Available Tools' list after the tool is marked as 'for-sale'.
Subtasks: A mother task is needed.

Abstract Code
Sell Tool

- If a tool's rent times is 50 after returned, the tools status is automatically marked as 'for-sale'.
- If a tool's rent time is smaller than 50:
    - Clerk User clicks on ***Sell Tool*** button from **Clerk Main Menu:**
    - Run the **Sell Tool** task:
        - Clerk User inputs the *Sale Date*.
        - Clerk User run **Check Tool Availability** task: Clerk User clicks ***Search*** button, find the tools which fulfil the search conditions; Display the Tool ID, Tool Description, Rental Price, Deposit Price.
        - If clerk clicks the **Tool Description**, detail description of the tool is shown in new window.
        - If Clerk User clicks the ***Sell Tool*** button, mark the tool status as 'for-sale' and clerk ID is recorded in database.

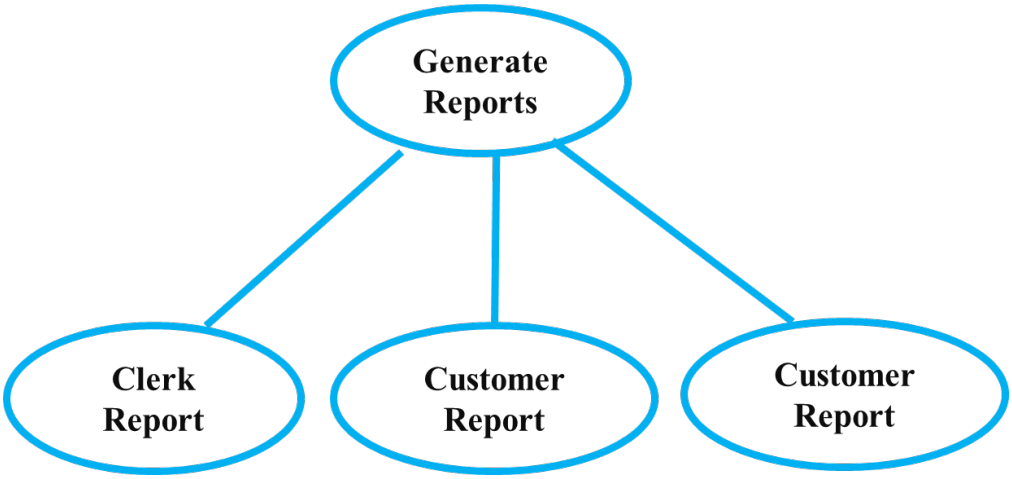
View Sale Status
Task Decomposition

Lock Types: 'View Sale Status' is read-only for Clerk User.
Number of Locks: Single.
Enabling Conditions: 'View Sale Status' are enabled by a clerk's Sale Status task.
Frequency: Low.
Consistency(ACID): Not critical.
Subtasks: Mother Task is not needed. No decomposition needed.

Abstract Code
View Sale Status

- Clerk User clicks on ***Sale Status*** button from **Clerk Main Menu:**
- Run the **View Sale Status** task:
  - Clerk User inputs *Tool Category* (radio buttons) and *keyword tool short-description*.
  - Clerk User clicks ***Search*** button, find the tools was marked as 'for-sale' which fulfil the search conditions; Display the Tool ID, Current Status, Description, Customer, Sale Price, Sale Date and Clerk ID.
  - If Clerk User clicks the **Tool Description**, detail description of the tool is shown in a new window.

Generate Reports
Task Decomposition



Lock Types: 3 read-only lookups of Clerk Report, Customer Report and Tool Report.
Number of Locks: Several different schema constructs are needed
Enabling Conditions: All 3 are enabled by a clerk's login
Frequency: Monthly – All 3 have the same frequency
Consistency (ACID): is not critical
Subtasks: All tasks must be done, but can be done in parallel. Mother tasks is required to coordinate subtasks. Order is not necessary.
Abstract Code

- Clerk clicked on ***Generate Reports*** button from **Main Menu** – jump to the Select a Report menu.
- Click ***Clerk Report button*** button, Jump to **Generate Clerk Report** task
  - Run the **Generate Clerk Report** task: query for information about the clerks and their profile where #ClerkID is the ID of the current clerk using the system from the HTTP Session/Cookie.
  - Find the report lists of the Clerk including employee number, full name, email, total pick-ups, total drop-offs and etc.
  - Display the report lists of the above.
- Click ***Customer Report*** button, Jump to **Generate Customer Report** task

  - Run the **Generate Customer Report** task: query for information about the customers and their profile where #CustomerID is the ID of the current customer using the system from the HTTP Session/Cookie.
  - Find the report lists of the Customers including Customer ID, First Name, Middle Name, Last Name, total reservations and etc.
  - Display the report lists of the above.
- Click ***Tool Inventory Report*** button, Jump to **Tool Inventory Report** task.
  - Run the **Generate tool Report** task: query for information about the tools and their profile where #ToolID is the ID of the current tools using the system from the HTTP Session/Cookie.
  - Find the report lists of the tools including tools ID, current status, Date, Description, total cost, total profit and etc.
  - Display the report lists of the above.