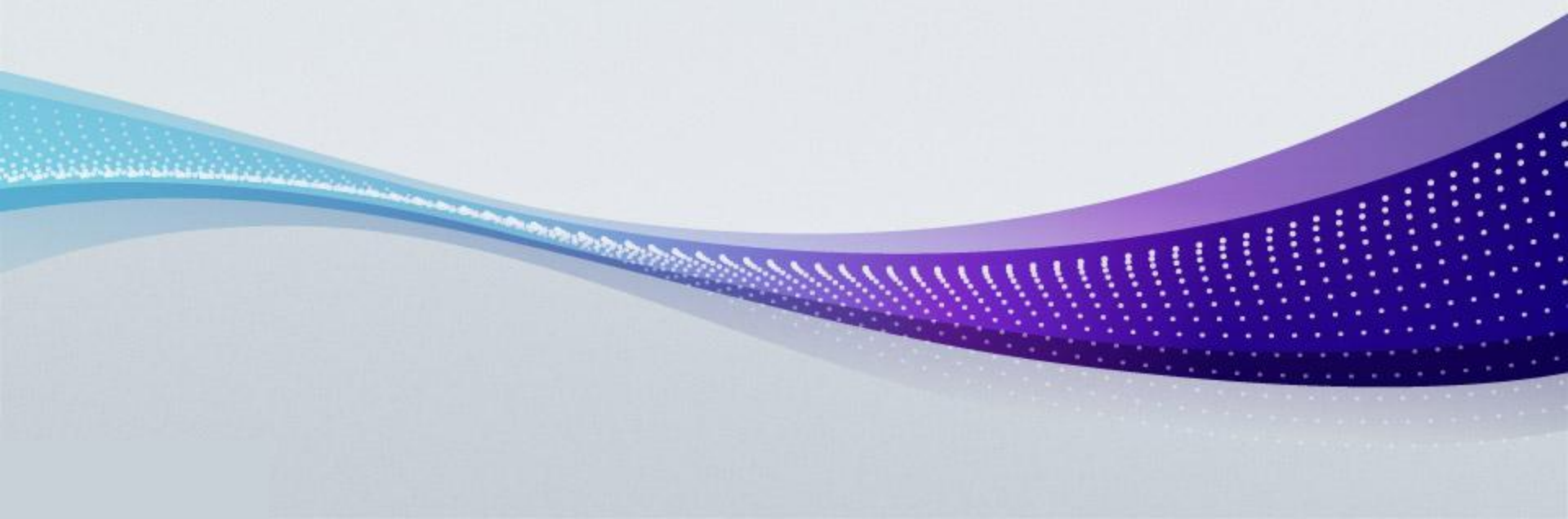200412301 권용휘
200412359 최원석
200511337 양지승
200611517 정훈섭

Sweet heart

The ultimate coffee machine you've dreamed of

1001. Define Draft Plan

- Motivation
  - According to the statistics from the Seoul Economy, a person in South Korea consumes 312 cups of coffee in a year
  - Nowadays, more and more people consume coffee and they need smarter and more comfortable way of coffee break
  - But, there is no smart coffee machine which can serve personalized coffee in a comfortable way people would like to have

- Objectives
  - To develop a smart and comfortable coffee machine which provides below features
    - Suggest coffee and music based on the user's feeling
    - Personalization features by adapting users' experiences
    - Drive to the user by remote controller for user's convenience
  - The new product should be accessible and efficient

1001. Define Draft Plan

- Functional Requirement
  - Register product identification information
  - Save and update user's preferences about coffee
  - Reset saved records to initialize machine
  - Select coffee among regular coffee and recommended coffee
  - Select amount of coffee
  - Select portion of water to adjust the strength of coffee
  - Confirm ordered coffee
  - Cancel ordered coffee
  - Select music (Browse through the music lists)
  - Play music
  - Stop music
  - Change volume

1001. Define Draft Plan

- Functional Requirement
  - Change mode to drive
  - Select a camera
  - Change the direction of the machine
  - Change velocity

- Non functional requirements
  - The average response time is a second except when the system is serving coffee
  - The system should serve a cup of coffee in 2 minutes
  - The system should be expandable and maintainable

1001. Define Draft Plan

- Resource Estimation
    - Human Effort (M/M) : 4-1.5 M/M
    - Human Resources : 4
    - Duration : 6 weeks
    - Budget : $100,000 USD

- Other Information
    - Future version
        - Add Bluetooth or AdHoc devices to communicate in small area
        - More features to be a comfortable machine will be added

1002. Create Preliminary Investigation Report

- ## Alternative Solutions
  - ### Outsourcing
    - Outsourcing the whole system is undesirable since it is hard to open the concept of this machine because it is a sort of a novel machine.
  - ### Purchasing a similar product
    - There is no similar product in the market

- ## Project Justification
  - ### Cost : $100,000 USD
  - ### Duration : 6 weeks
  - ### Risk
    - Lack of time for the project because of the time conflict
    - Lack of experience about developing whole system
    - Team communication
  - ### Effect
    - Not only serve high quality coffee, but also give an extraordinary experience!

1002. Create Preliminary Investigation Report

- Risk Management

Risk	Probability	Significance	Weight
First adoption of OSP	4	4	16
Team communication	4	4	16
Lack of time for the project because of the time conflict	4	5	20
Lack of experience about developing whole system	3	4	12
Lack of domain knowledge	4	3	12

1002. Create Preliminary Investigation Report

- Risk Reduction Plan
  - Lack of time for the project because of the time conflict
    - Distribute tasks wisely and give penalties to a person who does not complete his work
  - First Adoption of OSP
    - Ask questions to a professor to get the right way
  - Team Communication
    - Arrange a team meeting on every Wednesday

- Market Analysis
  - A coffee business is sharply increasing
  - More and more people need high quality coffee with reasonable price
  - A cup of coffee is not just a drink, it is a way of leisure

1002. Create Preliminary Investigation Report

- Other Managerial Issues
  - The project should be completed by April, 2011
  - Plan to participate in a competition among students

1003. Define Requirements

- Functional Requirement
  - Register product identification information
    - Register remote controller and coffee machine's identification information to match and authorize an user and a machine
  - Save and update user's preferences about coffee
    - Save and user's preference about coffee to recommend coffee based on personal preferences
  - Reset saved records to initialize machine
    - Reset saved records such as ordered coffee history to initialize machine
  - Select coffee among regular coffee and recommended coffee
    - Show regular coffee menu with recommended coffee to give an user variety options
  - Select amount of coffee
    - Allow an user to choose size of coffee
  - Select portion of water to adjust the strength of coffee
    - Allow an user to adjust strength of coffee by changing amount of water in the coffee

1003. Define Requirements

- Functional Requirement
  - Confirm ordered coffee
    - Show all options an user has selected and make sure those options just before start to make a cup of coffee
  - Cancel ordered coffee
    - Cancel ordered coffee which might be in progress of making. If a machine received a cancel command, it stops producing immediately and give it to the user even if it is not finished.
  - Select music (Browse through the music lists)
    - Allow to select a music based on a genre or a musician by navigating lists
  - Play music
    - Play music to have a great time with coffee. This feature is going to serve a comfortable and romantic atmosphere during your coffee break
  - Stop music
    - Stop music and move on to the another user interface such as music selection page
  - Change volume
    - Adjust volume to make a good coffee break

1003. Define Requirements

- Functional Requirement
  - Change mode to drive
    - Change operation mode to drive machine to the user
  - Select a camera
    - This machine has four cameras, each camera serve the view of north, south, east and west direction. This command make an user select a camera among those four
  - Change direction of the machine
    - Allow an user to change machine's direction to drive to the user properly
  - Change velocity
    - Allow an user to move machine. In this machine, velocity can be changed from minus to plus which means a reverse direction and a forward direction

1003. Define Requirements

- Functional Requirements (Categorized Table)

Ref. #	Function	Category
R1.1	Register product	Hidden
R1.2.1	Save personal preferences	Evident
R1.2.2	Update personal preferences	Evident
R1.2.2	Reset saved records	Evident
R1.3.1	Choose coffee to recommend	Hidden
R1.3.2	Show all menus with recommended coffee	Evident
R1.3.3	Select amount of coffee	Evident
R1.3.4	Select portion of water	Evident
R1.4.1	Confirm ordered coffee	Evident
R1.4.2	Cancel ordered coffee	Evident
R1.5	Show remained ingredients	Evident
R1.6.1	Show recommended music	Evident
R1.6.2	Select music	Evident

1003. Define Requirements

- Functional Requirements (Categorized Table)

Ref. #	Function	Category
R1.6.3	Play music	Evident
R1.6.4	Stop music	Evident
R1.6.5	Change volume	Evident
R1.7.1	Change mode to drive	Evident
R1.7.2	Select a camera	Evident
R1.7.3	Change direction of the machine	Evident
R1.7.4	Change velocity	Evident
R1.7.5	Detect obstacles	Evident
R1.8	Save user's decision	Hidden

1003. Define Requirements

- Performance Requirements
  - The average response time should be shorter than a second excluding making coffee

- Operating Environments
  - Coffee machine
    - OS: Embedded Linux
    - CPU: ARM RISC CHOI
    - Memory: 128MB
    - HDD: 32GB
  - Remote controller
    - All kinds of cell phones which support web access
  - Web Server
    - OS: Debian Linux
    - CPU: Intel i7
    - Memory: 4GB
    - HDD: 500GB

1003. Define Requirements

- Development Environments
  - Hardware
    - Web server (Intel x86 PC)
    - Embedded Systems (ARM)
  - Software
    - Database: MySQL
    - Programming Language: C/C++, php, HTML
    - Programming Tools: KDevelop
    - UML Tools: StarUML

- Interface Requirements
  - All devices should support touch based input system
  - All features should be controlled by cell phones
  - Support direct input by buttons
  - Show progresses on the screen during working
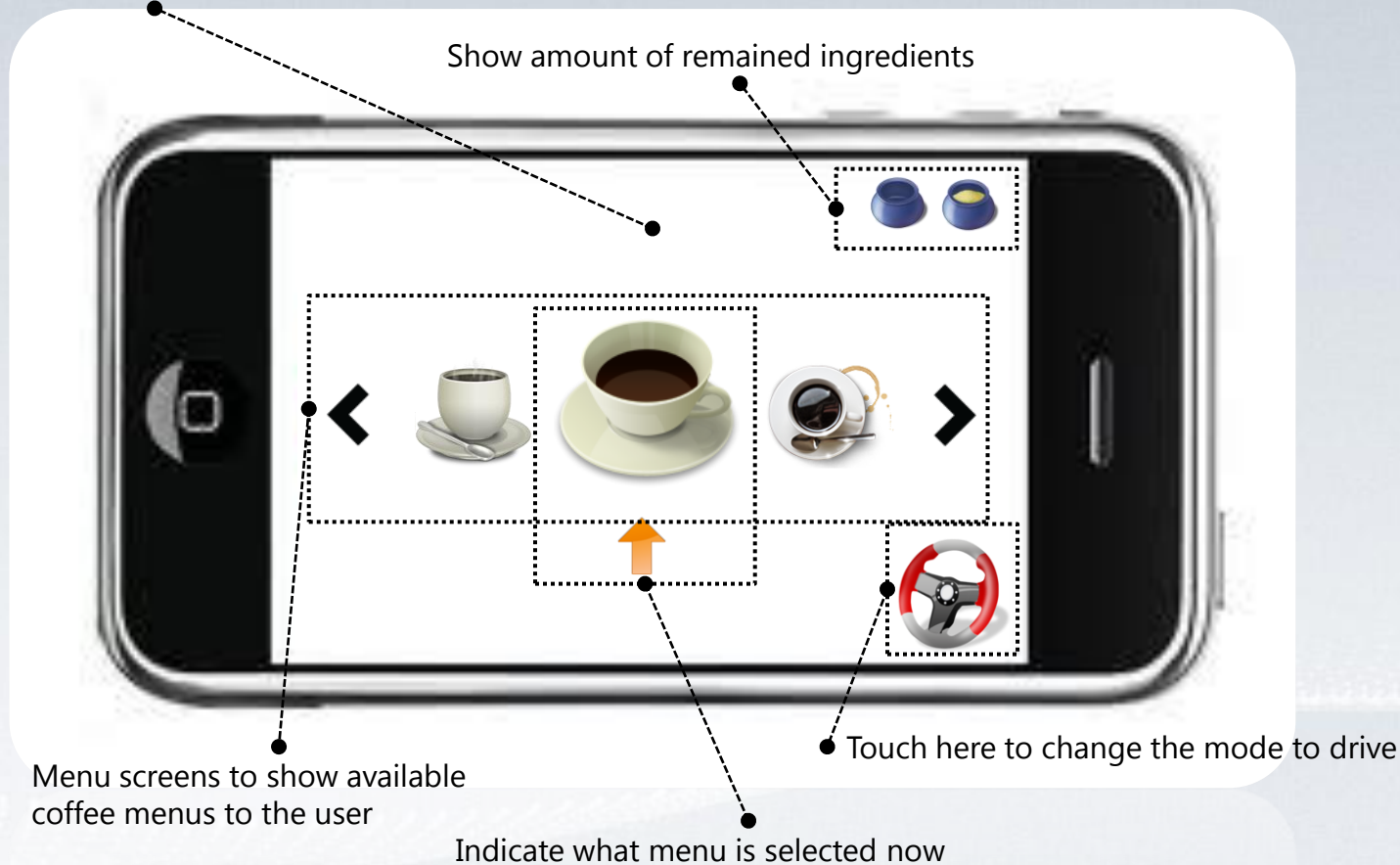
1003. Define Requirements

- Other Requirements
  - The machine should maintain secure system during the operation

1004. Record terms in Glossary

Terms	Description	Remarks
Register product	Register information on product and remote controller to authorize those the machine	
Personal preferences	An user's preferences based on preferred coffee, age, sex of the person	
Records	Saved user's past decisions in the database in order to use it to the recommending process	
Amount of coffee	Amount of coffee which is expressed by cup size, Tall, Grande and Short.	
Portion of water	Amount of water to adjust strength of coffee	
Ingredients	Ingredients to make a cup of coffee such as sugar	
Mode to drive	Mode for driving in order to move machine to the user. If an user change the mode to drive, the screen show a scene from the camera to drive the machine properly	
Camera	Cameras attached the machine. The machine has four cameras to cover all directions by switching cameras	
Obstacles	Things that prevent going through the way such as books, chairs and desks	

1005. Implement Prototype

Basically, the system is implemented on a cell phone

Show amount of remained ingredients

Menu screens to show available coffee menus to the user

Indicate what menu is selected now

Touch here to change the mode to drive

1006. Define Business Use-cases

-   Define System boundary

Sweet heart
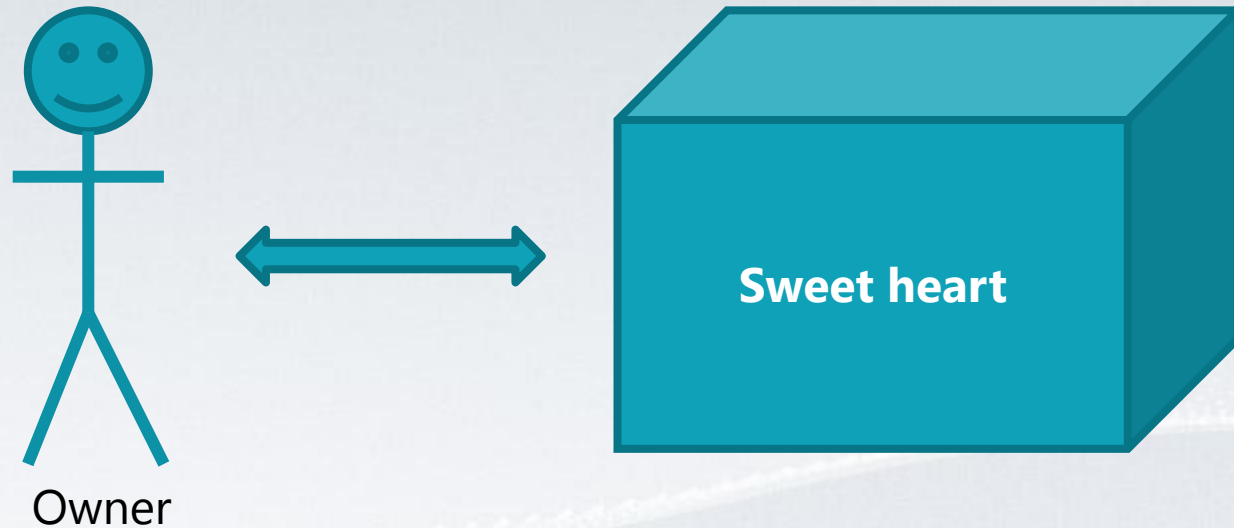
Owner

1006. Define Business Use-cases

- Identify and Describe Actors
  - Owner
    - A person who owns coffee machine.
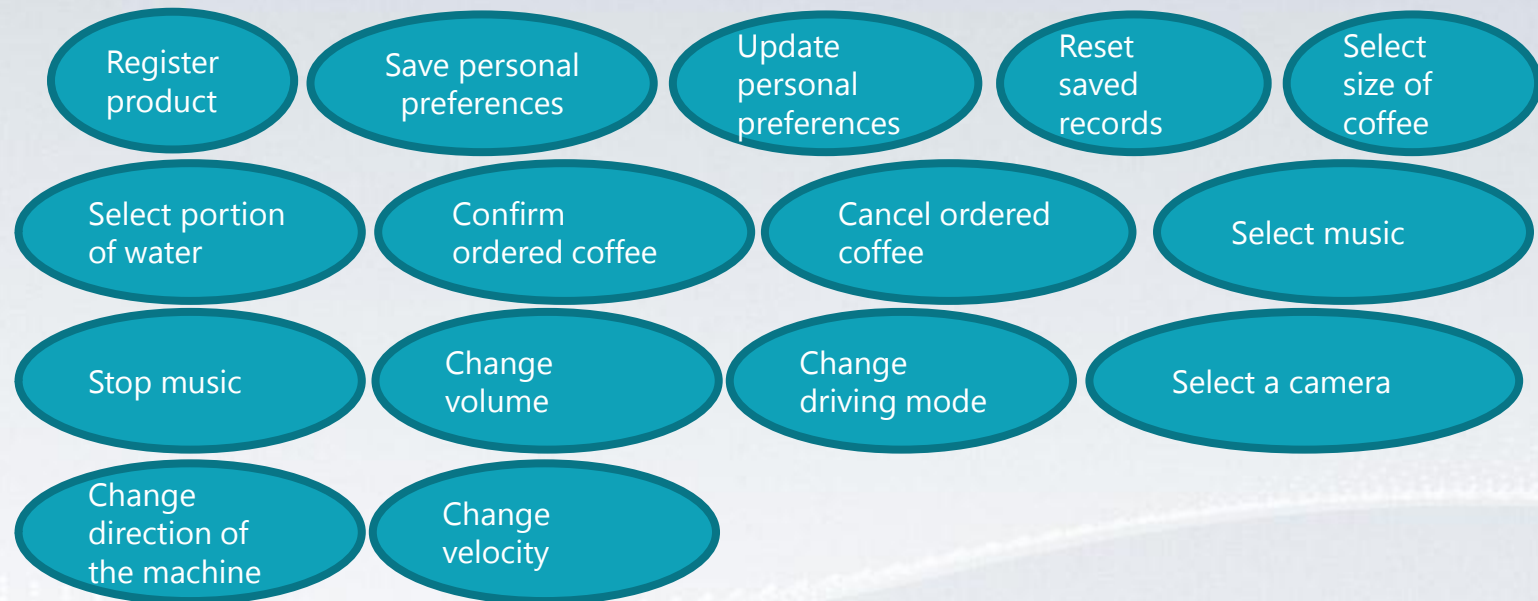   - The owner is able to order coffee and access privileged commands

1006. Define Business Use-cases

- Identify Use cases
  - Use cases by actor-based
    - Owner

Register product

Save personal preferences

Update personal preferences

Reset saved records

Select size of coffee

Select portion of water

Confirm ordered coffee

Cancel ordered coffee

Select music

Stop music

Change volume

Change driving mode

Select a camera

Change direction of the machine

Change velocity

1006. Define Business Use-cases

- Identify Use cases
  - Use cases by event-based
    - Owner

1006. Define Business Use-cases

- Allocate System Functions into Related Use-Cases (1/2)

Ref. #	Function	Use-case Number and Name
R1.1	Register product	1. Register product
R1.2.1	Save personal preferences	2. Save personal preferences
R1.2.2	Update personal preferences	3. Update personal preferences
R1.2.2	Reset saved records	4. Reset saved records
R1.3.1	Choose coffee to recommend	5. Choose coffee to recommend
R1.3.2	Show all menus with recommended coffee	6. Show menu
R1.3.3	Select size of coffee	7. Select size of coffee
R1.3.4	Select portion of water	8. Select portion of water
R1.4.1	Confirm ordered coffee	9. Confirm ordered coffee
R1.4.2	Cancel ordered coffee	10. Cancel ordered coffee
R1.5	Show remained materials	11. Show remained materials
R1.6.1	Show recommended music	12. Show recommended music
R1.6.2	Select music	13. Select music

1006. Define Business Use-cases

- Allocate System Functions into Related Use-Cases (2/2)

Ref. #	Function	Use-case Number and Name
R1.6.3	Play music	14. Play music
R1.6.4	Stop music	15. Stop music
R1.6.5	Change volume	16. Change volume
R1.7.1	Change mode to drive	17. Change mode to drive
R1.7.2	Select a camera	18. Select a camera
R1.7.3	Change direction of the machine	19. Change direction
R1.7.4	Change velocity	20. Change velocity
R1.7.5	Detect obstacles	21. Detect obstacles
R1.8	Save user's decision	22. Save user's decision

1006. Define Business Use-cases

- Categorized use cases (1/2)

| Ref. #	Function	Use-case Number and Name	Category
R1.1	Register product	1. Register product	Primay
R1.2.1	Save personal preferences	2. Save personal preferences	Primary
R1.2.2	Update personal preferences	3. Update personal preferences	Primary
R1.2.2	Reset saved records	4. Reset saved records	Primary
R1.3.1	Choose coffee to recommend	5. Choose coffee to recommend	Primary
R1.3.2	Show all menus with recommended coffee	6. Show menu	Primary
R1.3.3	Select size of coffee	7. Select size of coffee	Primary
R1.3.4	Select portion of water	8. Select portion of water	Primary
R1.4.1	Confirm ordered coffee	9. Confirm ordered coffee	Primary
R1.4.2	Cancel ordered coffee	10. Cancel ordered coffee	Primary
R1.5	Show remained materials	11. Show remained materials	Primary
R1.6.1	Show recommended music	12. Show recommended music	Primary
R1.6.2	Select music	13. Select music	Primary

1006. Define Business Use-cases

- Categorized use cases (2/2)

| Ref. #	Function	Use-case Number and Name	Category
R1.6.3	Play music	14. Play music	Primary
R1.6.4	Stop music	15. Stop music	Primary
R1.6.5	Change volume	16. Change volume	Primary
R1.7.1	Change mode to drive	17. Change mode to drive	Primary
R1.7.2	Select a camera	18. Select a camera	Primary
R1.7.3	Change direction of the machine	19. Change direction	Primary
R1.7.4	Change velocity	20. Change velocity	Primary
R1.7.5	Detect obstacles	21. Detect obstacles	Primary
R1.8	Save user's decision	22. Save user's decision	Primary

1006. Define Business Use-cases
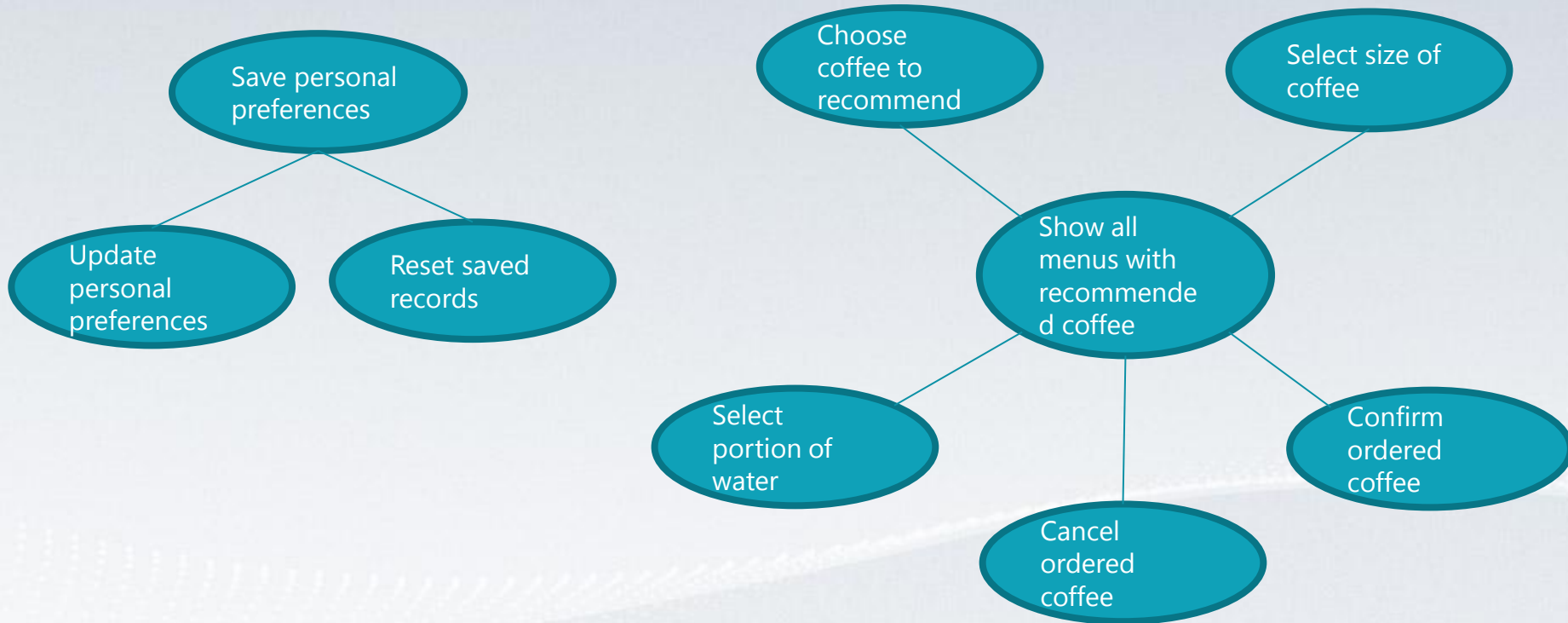
- Identify the relationships between Use-Cases

1006. Define Business Use-cases

- Identify the relationships between Use-Cases
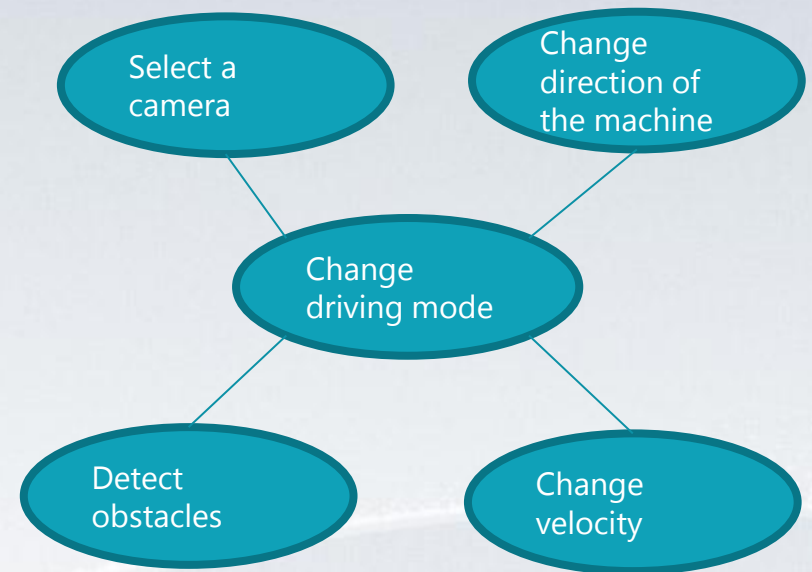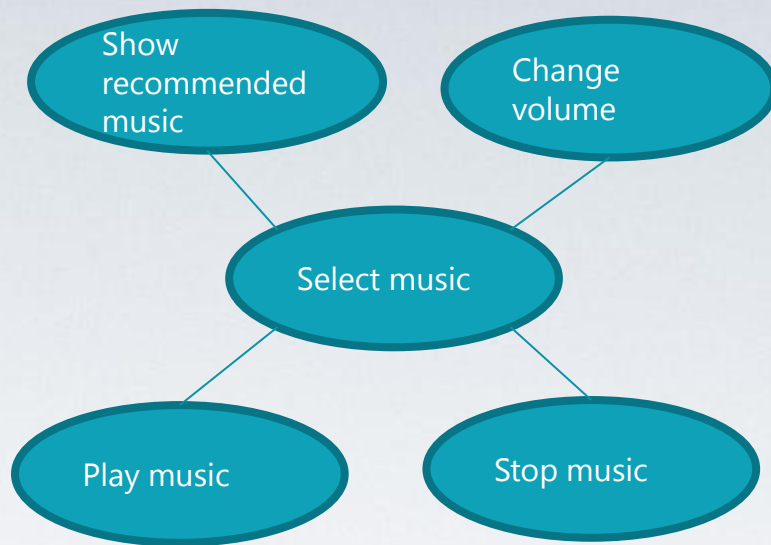
1006. Define Business Use-cases

- Draw an use-case diagram
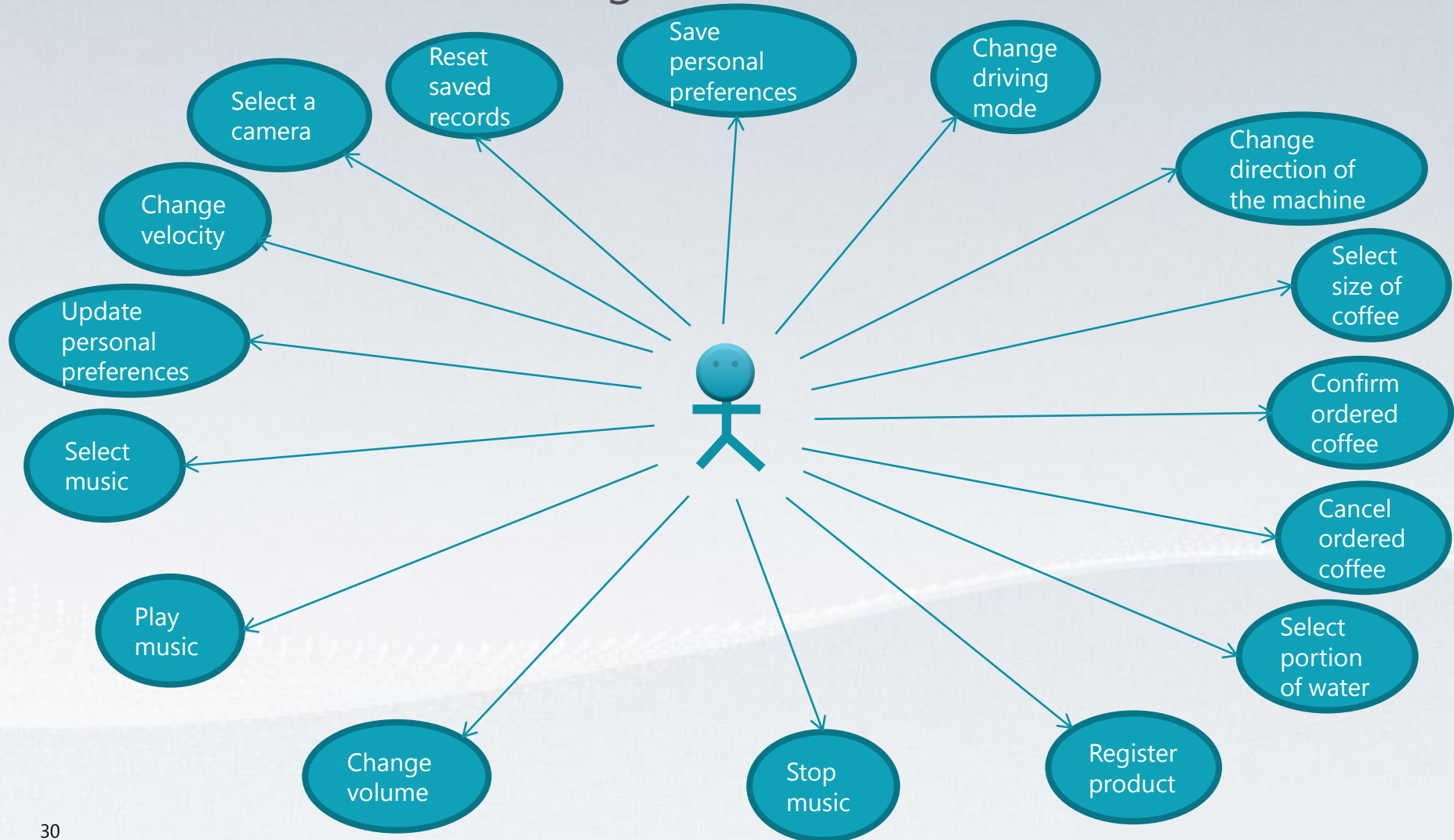
1006. Define Business Use-cases

- Describe use-cases

Name	Description
1. Register product	- This use case registers identification information of product and remote controller on the web server to authorize the user when they try to access the machine.
Actor	
Owner	

Name	Description
2. Save personal preferences	- This use case saves personal preferences on the coffee by storing preferred coffee, sugar portion in the coffee on the web server.
Actor	
Owner	

1006. Define Business Use-cases

- Describe use-cases

Name	Description
3. Update personal preferences	- This use case updates personal preference saved at use case number 2.
Actor	
Owner	

Name	Description
4. Reset saved records	- This use case deletes all and initialize the saved user's past decision on the database.
Actor	
Owner	

1006. Define Business Use-cases

- Describe use-cases

Name	Description
5. Choose coffee to recommend	- This use case makes a decision on the recommended coffee. - The recommended coffee is selected based on saved owner's preference, weather, bio-rhythm, special day.
Actor	
Owner	

Name	Description
6. Show all menus with recommended coffee	- This use case show all available menus with the recommended coffee chosen by use-case number 5.
Actor	
Owner	

1006. Define Business Use-cases

- Describe use-cases

Name	Description
7. Select size of coffee	- This use case selects size of coffee. - The size of coffee in this machine should be one of the following list, Short, Tall and Grande.
Actor	
Owner	

Name	Description
8. Select portion of water	- This use case adjusts amount of water in the coffee. - User can increase and decrease based on the default amount of water in the coffee.
Actor	
Owner	

1006. Define Business Use-cases

- Describe use-cases

Name	Description
9. Confirm ordered coffee	This use case makes a cup of coffee based on the selected options.
Actor	
Owner	

Name	Description
10. Cancel ordered coffee	- This use case cancels ordered coffee.
Actor	
Owner	

1006. Define Business Use-cases

- Describe use-cases

Name	Description
11. Show remained materials	- This use case shows amount of remained ingredients. - If one of the ingredient is insufficient, shows the alarm message to the user.
Actor	
Owner	

Name	Description
12. Show recommended music	- This use case recommends the music to play during the coffee break.
Actor	
Owner	

1006. Define Business Use-cases

- Describe use-cases

Name	Description
13. Select music	- This use case selects the music - Lists are shown by genres and generations.
Actor	
Owner	

Name	Description
14. Play music	- This use case plays selected music.
Actor	
Owner	

1006. Define Business Use-cases

- Describe use-cases

Name	Description
15. Stop music	- This use case stops the music which is playing now
Actor	
Owner	

Name	Description
16. Change volume	- This use case changes the system volume.
Actor	
Owner	

1006. Define Business Use-cases

- Describe use-cases

Name	Description
17. Change driving mode	- This use case changes the mode to drive. - If the mode has changed, the machine, the Sweet heart, stops serving the features related to the coffee maker and protects the coffee during the driving activities.
Actor	
Owner	

Name	Description
18. Select a camera	- This use case selects the camera on the Sweet heart during the driving. - The cameras are attached on the forward, backward, left and right size of the machine. It will covers north, south, east and west size of the machine.
Actor	
Owner	

1006. Define Business Use-cases

- Describe use-cases

Name	Description
19. Change direction of the machine	- This use case changes the direction of the Sweet heart during the driving - The direction can be changed to forward, backward, left and right.
Actor	
Owner	

Name	Description
20. Change velocity	- This use case adjusts the velocity of the Sweet heart during the driving. - The velocity can be changed from minus to plus. - The machine has a speed limit to be a secure machine.
Actor	
Owner	

1006. Define Business Use-cases

- Describe use-cases

Name	Description
21. Detect obstacles	- This use case detects obstacles which prevents the machine from going through. - If the machine detects obstacles, it will immediately stop to prevent crash to the obstacles.
Actor	
Owner	

Name	Description
22. Save user's decision	- This use case saves decisions from the Owner to the database on the web server. - The following information will be saved. Selected coffee, size of coffee, amount of water in the coffee and information of chosen music.
Actor	
Owner	

1006. Define Business Use-cases

- Rank use-cases

Rank	Use-case Number & Name
High	1. Register product
High	2. Save personal preferences
High	3. Update personal preferences
High	4. Reset saved records
High	5. Choose coffee to recommend
High	6. Show all menus with recommended coffee
High	7. Select size of coffee
High	8. Select portion of water
High	9. Confirm ordered coffee
High	10. Cancel ordered coffee
High	11. Show remained materials
High	12. Show recommended music
High	13. Select music

1006. Define Business Use-cases

- Rank use-cases

Rank	Use-case Number & Name
High	14. Play music
High	15. Stop music
High	16. Change volume
High	17. Change driving mode
High	18. Select a camera
High	19. Change direction of the machine
High	20. Change velocity
High	21. Detect obstacles
High	22. Save user's decision

1007. Define Business Concept Model

- Identify 'Concepts' in Domain

Product ID	Coffee	Size	Water
preference	beans	sugar	cream
milk	music	volume	drive
Genre (music)	velocity	obstacle	weather
seasons	degree	Special day	Bio rhythm
sex	age	recommendation	direction

1008. Define Draft System Architecture

- Identify 'Concepts' in Domain

User (Remote Controller)

Web Server

Sweet heart

Database Server

Sweet heart is connected to the user by using wireless networks

The user makes Sweet heart move by using a cell phone to serve a cup of coffee.

Sweet heart reports every tasks he did and Web Server saves reported tasks on Database server in order to serve those information to Personalization components

Web server serves features about Personalization and Emotional

Has a separated database server to build more secure system

1009. Refine Plan

- Project Scope
  - According to the statistics from newspaper(Seoul Economy), a person consumes 312 cups of coffee in a year
  - Nowadays, more and more people consumes coffee and they need smarter and more comfortable way of coffee
  - But there is no smart coffee machine which can serve personalized coffee in a comfortable way

- Project Objectives
  - To develop a smart and comfortable coffee machine which provides below features
    - Suggest coffee and music based on the user's feeling
    - Personalization features by adapting users' experiences
    - Find and move to the user automatically for user's convenience
  - The new product should be accessible and efficient

1009. Refine Plan

- Functional Requirements

Ref. #	Function	Category
R1.1	Register product	Hidden
R1.2.1	Save personal preferences	Evident
R1.2.2	Update personal preferences	Evident
R1.2.2	Reset saved records	Evident
R1.3.1	Choose coffee to recommend	Hidden
R1.3.2	Show all menus with recommended coffee	Evident
R1.3.3	Select amount of coffee	Evident
R1.3.4	Select portion of water	Evident
R1.4.1	Confirm ordered coffee	Evident
R1.4.2	Cancel ordered coffee	Evident
R1.5	Show remained ingredients	Evident
R1.6.1	Show recommended music	Evident
R1.6.2	Select music	Evident

1009. Refine Plan

- Functional Requirements

Ref. #	Function	Category
R1.6.3	Play music	Evident
R1.6.4	Stop music	Evident
R1.6.5	Change volume	Evident
R1.7.1	Change mode to drive	Evident
R1.7.2	Select a camera	Evident
R1.7.3	Change direction of the machine	Evident
R1.7.4	Change velocity	Evident
R1.7.5	Detect obstacles	Evident
R1.8	Save user's decision	Hidden

1009. Refine Plan

- Performance Requirements
  - The average response time should be shorter than a second excluding making coffee

- Operating Environments
  - Coffee machine
    - OS: Embedded Linux
    - CPU: ARM RISC CHOI
    - Memory: 128MB
    - HDD: 32GB
  - Remote controller
    - All kinds of cell phones which support web access
  - Web Server
    - OS: Debian Linux
    - CPU: Intel i7
    - Memory: 4GB
    - HDD: 500GB
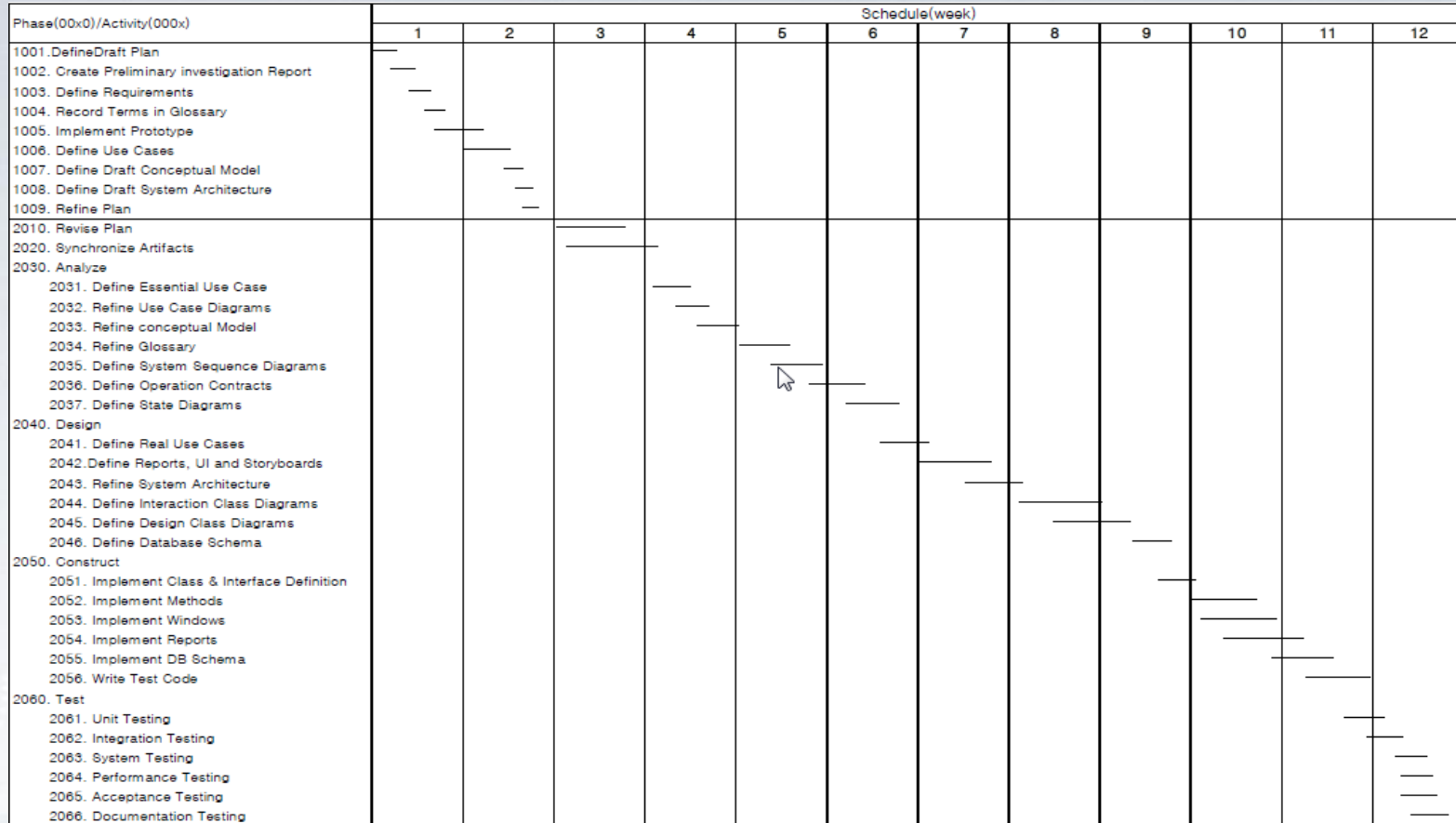
1009. Refine Plan

- User Interface Requirements
  - All devices should support touch based input system
  - All features should be controlled by cell phones
  - Support direct input by buttons
  - Show progresses on the screen during working

- Other Requirements
  - The machine should maintain secure system during the operation

1009. Refine Plan

- Resources
  - Human Effort (M/M) : 4-1.5 M/M
  - Human Resources : 4
  - Duration : 6 weeks
  - Budget : $100,000 USD

1009. Refine Plan

- Scheduling

| Phase(00x0)/Activity(000x)	Schedule(week)											
	1	2	3	4	5	6	7	8	9	10	11	12
1001.DefineDraft Plan												
1002. Create Preliminary investigation Report												
1003. Define Requirements												
1004. Record Terms in Glossary												
1005. Implement Prototype												
1006. Define Use Cases												
1007. Define Draft Conceptual Model												
1008. Define Draft System Architecture												
1009. Refine Plan												
2010. Revise Plan												
2020. Synchronize Artifacts												
2030. Analyze												
2031. Define Essential Use Case												
2032. Refine Use Case Diagrams												
2033. Refine conceptual Model												
2034. Refine Glossary												
2035. Define System Sequence Diagrams												
2036. Define Operation Contracts												
2037. Define State Diagrams												
2040. Design												
2041. Define Real Use Cases												
2042.Define Reports, UI and Storyboards												
2043. Refine System Architecture												
2044. Define Interaction Class Diagrams												
2045. Define Design Class Diagrams												
2046. Define Database Schema												
2050. Construct												
2051. Implement Class & Interface Definition												
2052. Implement Methods												
2053. Implement Windows												
2054. Implement Reports												
2055. Implement DB Schema												
2056. Write Test Code												
2060. Test												
2061. Unit Testing												
2062. Integration Testing												
2063. System Testing												
2064. Performance Testing												
2065. Acceptance Testing												
2066. Documentation Testing												

1009. Refine Plan

- Quality Assurance Plan
  - Formal Technical Review(FTR) : Inspection & Work-through
    - Should be applied to each activity
  - Define Quality Assurance Metrics

State 2000. Build

Sweet heart

The ultimate coffee machine you've dreamed of
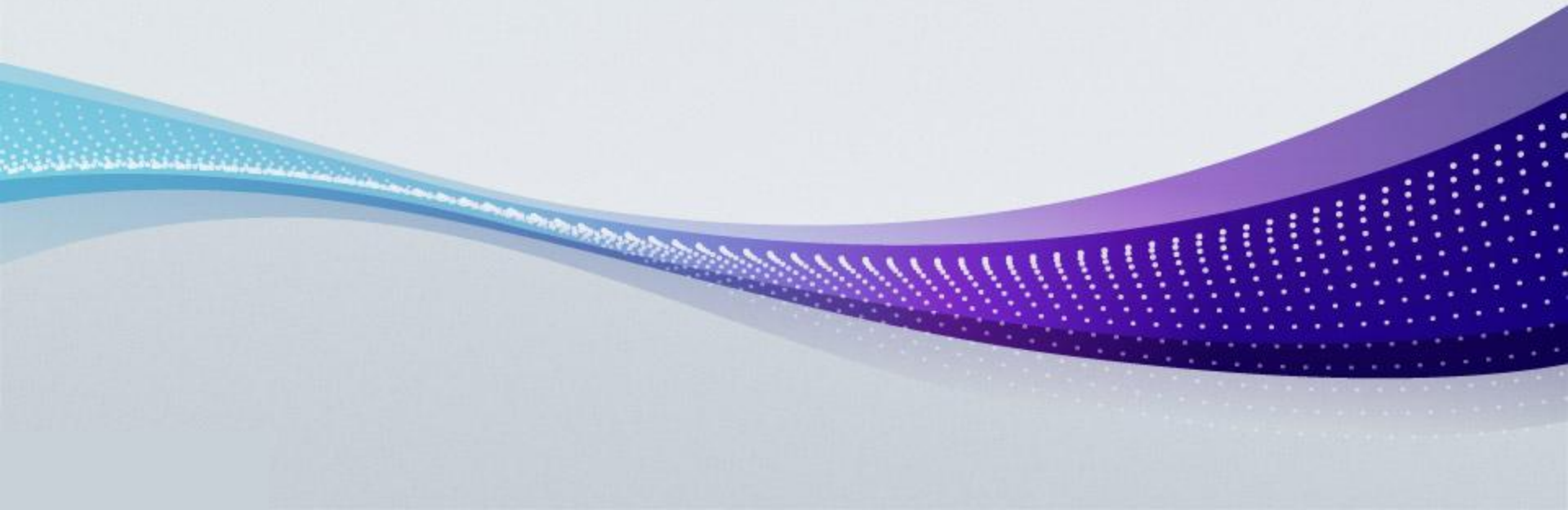
2110. Revise Plan

- Remove driving mode
  - Why?
    After the presentation we found that users, especially our supporter, have negative opinion about it. Therefore, to fit their needs, we decided to remove that feature including its sub functions.
  - Affected requirements
    Requirements R1.7.1, R1.7.2, R1.7.3, R1.7.4, R1.7.5 were removed
- Altering user information related features
  - Why?
    To extend this machine's information range. It deals information not only personal preferences, but also personal information.
  - Affected requirements
    A requirement R1.2.1. "Save personal preferences" was renamed to "Save personal information " which means that it saves personal information including personal preferences.

    A requirement R.1.2.2. "Update personal preferences" was renamed to "Update personal information" which means that it deals with personal information including personal preferences, same to R1.2.1

2110. Revise Plan

- Extending and altering Register product
  - Why?
    To make more users use this coffee machine easily and effectively
  - Affected requirements
    A requirement 1.1. "Register product" was renamed to "Register coffee machine" to clarify that product means the coffee machine, Sweet heart.
    Add new requirement which name is "Register the controller"
    Add new requirement which name is "Receive machine identification number" to register controller with related machine on the server
    Reorganize numbers of requirements below the R1.2.1

- Altering names of requirements
  - Why?
    To clarify meanings of requirements
  - Affected requirements
    A requirement 1.3.2 "Show all menus with recommended coffee" was renamed to "Request all menus with recommended coffee" to clarify that showing menu is a response of an user's request.

2110. Revise Plan

- Extending and altering domain concepts
  - Why?
    To refine domain concepts and find out more concrete concepts
  - Affected domain concepts
    All domain concepts are revised and redefined

2110. Revise Plan

- Revised definition of system boundary
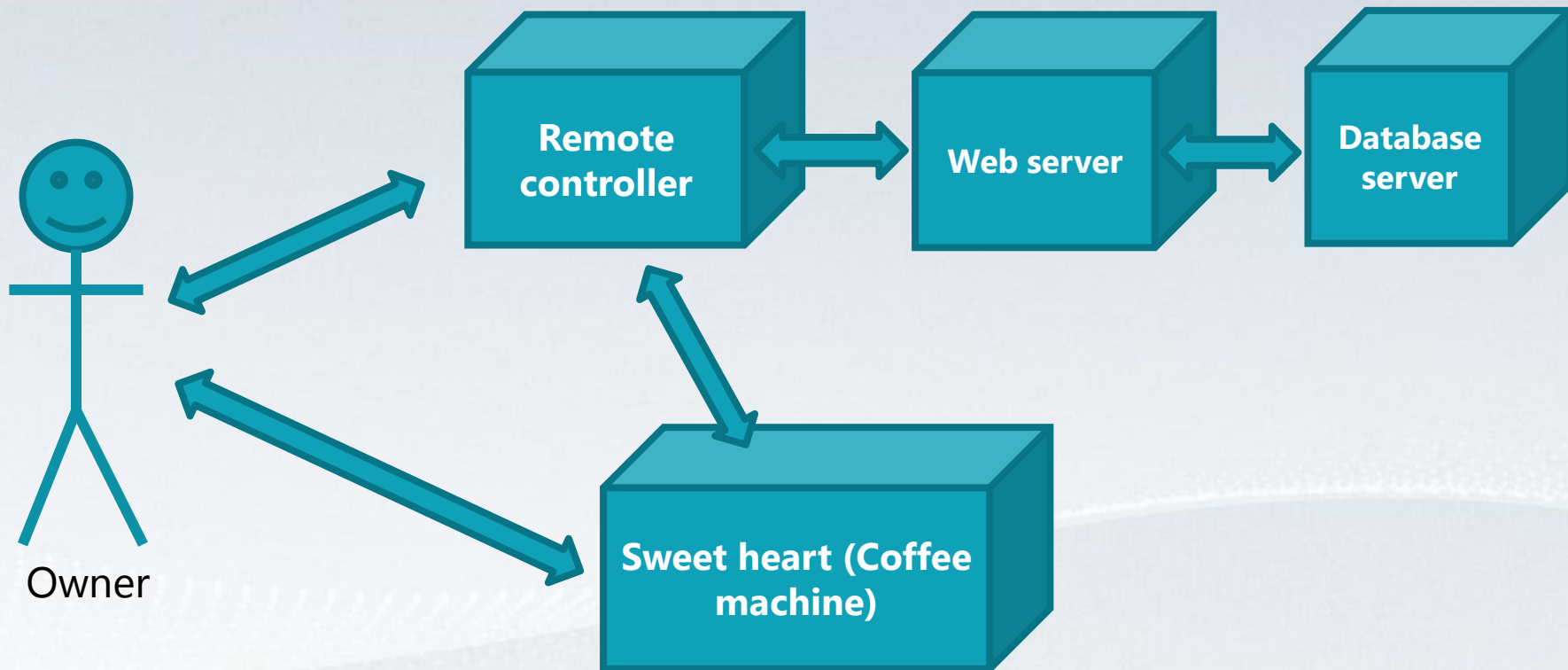
2110. Revise Plan

- Revised Categorized use cases (1/2)

Ref. #	Function	Use-case Number and Name	Category
R1.1.1	Register coffee machine	1. Register coffee machine	Primary
R1.1.2	Register controller	2. Register controller	Primary
R1.1.3	Receive machine identification number	3. Receive machine identification number	Primary
R1.2.1	Save personal information	4. Save personal information	Primary
R1.2.2	Update personal information	5. Update personal information	Primary
R1.2.3	Reset saved records	6. Reset saved records	Primary
R1.3.1	Choose coffee to recommend	7. Choose coffee to recommend	Primary
R1.3.2	Request all menus with recommended coffee	8. Request all menus with recommended coffee	Primary
R1.3.3	Select size of coffee	9. Select size of coffee	Primary
R1.3.4	Select portion of water	10. Select portion of water	Primary
R1.4.1	Confirm ordered coffee	11. Confirm ordered coffee	Primary
R1.4.2	Cancel ordered coffee	12. Cancel ordered coffee	Primary
R1.5	Show remained materials	13. Show remained materials	Primary

2110. Revise Plan

- Revised Categorized use cases (2/2)

Ref. #	Function	Use-case Number and Name	Category
R1.6.1	Show recommended music	14. Show recommended music	Primary
R1.6.2	Select music	15. Select music	Primary
R1.6.3	Play music	16. Play music	Primary
R1.6.4	Stop music	17. Stop music	Primary
R1.6.5	Change volume	18. Change volume	Primary
R1.7	Save user's decision	19. Save user's decision	Primary

2110. Revise Plan

- Revised descriptions of use-cases

Name	Description
1. Register coffee machine	- This use case registers identification information of product and remote controller on the web server to authorize the users when they try to access the machine.
Actor	
Owner	

Name	Description
2. Register controller	- This use case registers controller with related coffee machine's information on the web server to authorize the users.
Actor	
Owner	

2110. Revise Plan

- Revised descriptions of use-cases

Name	Description
3. Receive machine identification number	- This use case receives machine identification number from sweet heart to register a relationship between sweet heart and remote controllers on the web server.
Actor	
Owner	

Name	Description
4. Save personal information	- This use case saves personal information including his or her preferences such as preferred coffee beans, sugar portion in the coffee on the web server.
Actor	
Owner	

2110. Revise Plan

- Revised descriptions of use-cases

Name	Description
5. Update personal information	- This use case updates personal information including his or her preference such saved at use case number 4.
Actor	
Owner	

Name	Description
6. Reset saved records	- This use case deletes all and initialize the saved user's past decision on the database.
Actor	
Owner	

2110. Revise Plan

- Revised descriptions of use-cases

Name	Description
7. Choose coffee to recommend	- This use case makes a decision on the recommended coffee. - The recommended coffee is selected based on saved owner's preference, weather, bio-rhythm, special day.
Actor	
Owner	

Name	Description
8. Request all menus with recommended coffee	- This use case show all available menus with the recommended coffee chosen by use-case number 7.
Actor	
Owner	

2110. Revise Plan

- Revised descriptions of use-cases

Name	Description
9. Select size of coffee	- This use case selects size of coffee. - The size of coffee in this machine should be one of the following list, Short, Tall and Grande.
Actor	
Owner	

Name	Description
10. Select portion of water	- This use case adjusts amount of water in the coffee. - User can increase and decrease based on the default amount of water in the coffee.
Actor	
Owner	

2110. Revise Plan

- Revised descriptions of use-cases

Name	Description
11. Confirm ordered coffee	This use case makes a cup of coffee based on the selected options.
Actor	
Owner	

Name	Description
12. Cancel ordered coffee	- This use case cancels ordered coffee.
Actor	
Owner	

2110. Revise Plan

- Revised descriptions of use-cases

Name	Description
13. Show remained materials	- This use case shows amount of remained ingredients. - If one of the ingredient is insufficient, shows the alarm message to the user.
Actor	
Owner	

Name	Description
14. Show recommended music	- This use case recommends the music to play during the coffee break.
Actor	
Owner	

2110. Revise Plan

- Revised descriptions of use-cases

Name	Description
15. Select music	- This use case selects the music - Lists are shown by genres and generations.
Actor	
Owner	

Name	Description
16. Play music	- This use case plays selected music.
Actor	
Owner	

2110. Revise Plan

- Revised descriptions of use-cases

Name	Description
17. Stop music	- This use case stops the music which is playing now
Actor	
Owner	

Name	Description
18. Change volume	- This use case changes the system volume.
Actor	
Owner	

2110. Revise Plan

- Revised descriptions of use-cases

Name	Description
19. Save user's decision	- This use case saves decisions from the Owner to the database on the web server. - The following information will be saved. Selected coffee, size of coffee, amount of water in the coffee and information of chosen music.
Actor	
Owner	

2110. Revise Plan

- Revised use-cases ranks

Rank	Use-case Number & Name
High	1. Register coffee machine
High	2. Register controller
High	3. Receive machine identification number
High	4. Save personal information
High	5. Update personal information
High	6. Reset saved records
High	7. Choose coffee to recommend
High	8. Request all menus with recommended coffee
High	9. Select size of coffee
High	10. Select portion of water
High	11. Confirm ordered coffee
High	12. Cancel ordered coffee
High	13. Show remained materials

2110. Revise Plan

- Revised use-cases ranks

Rank	Use-case Number & Name
High	14. Show recommended music
High	15. Select music
High	16. Play music
High	17. Stop music
High	18. Change volume
High	19. Save user's decision

2110. Revise Plan

- Revised Functional Requirements

Ref. #	Function	Category
R1.1.1	Register coffee machine	Hidden
R1.1.2	Register controller	Evident
R1.1.3	Receive machine identification number	Hidden
R1.2.1	Save personal information	Evident
R1.2.2	Update personal information	Evident
R1.2.3	Reset saved records	Evident
R1.3.1	Choose coffee to recommend	Hidden
R1.3.2	Request all menus with recommended coffee	Hidden
R1.3.3	Select size of coffee	Evident
R1.3.4	Select portion of water	Evident
R1.4.1	Confirm ordered coffee	Evident
R1.4.2	Cancel ordered coffee	Evident
R1.5	Show remained materials	Evident

2110. Revise Plan

- Revised Functional Requirements

Ref. #	Function	Category
R1.6.1	Show recommended music	Hidden
R1.6.2	Select music	Evident
R1.6.3	Play music	Evident
R1.6.4	Stop music	Evident
R1.6.5	Change volume	Evident
R1.7	Save user's decision	Hidden

2110. Revise Plan

- Revised 'Concepts' in Domain

Sweet heart	Address	Registered sweet heart	Web server
Recommended coffee	volume	Music name	Database server
username	weather	Remained prime	user
Remained beans	Remained cream	Remained milk	Saved decisions
Identification number	Remote controller	music	coffee
genre	artist	Coffee name	size
water	name	sex	birthday

2120. Synchronize Artifacts

- Control versions and variations
  - No description on synchronize artifacts since Sweet heart has no special version and variation

2131. Define Essential Use Cases

1. Register coffee machine

Element	Description
Use case	Register coffee machine
Actor	Sweet heart itself (the coffee machine)
Purpose	Build a list of coffee machines on the web server
Overview	Register identification information of product and remote controller on the web server to authorize the users when they try to access the machine.
Type	Primary and Essential
Cross reference	Functions : R1.1.1 Use Cases : "Register coffee machine" Relaying use cases : "Relay register coffee machine" , "Process register coffee machine"
Pre-requisites	N/A
Typical courses of events	(A) Actor(sweet heart), (W) Web server 1.　(A) A sweet heart checks whether it is registered or not when it is turned on automatically when the sweet heart is turned on 2.　(A) If it is not registered, a sweet heart sends a request to register itself on the web sever 3.　(W) The web server checks whether the requested sweet heart is registered or not. 4.　(W) If it is not registered, register it 5.　(W) The web server sends the result of the registration process to the sweet heart 6.　(A) Check if the registration has been done successfully and if there is an error, retry to register (2)
Alternative courses of events	N/A
Exceptional courses of events	Line 2. If the sweet heart cannot receive the result in a minute, retry to register automatically.

2131. Define Essential Use Cases

2. Register controller

Element	Description
Use case	Register controller
Actor	Owner
Purpose	Build a list of remote controllers and make relationships between sweet heart machines and remote controllers
Overview	Register controller with related coffee machine's information on the web server to authorize the users.
Type	Primary and Essential
Cross reference	Functions : R1.1.2 Use Cases : "Turn On", "Register Controller" Relaying use cases : "Relay controller registration","Process controller registration"
Pre-requisites	N/A
Typical courses of events	(A) Actor(Owner), (R) Remote Controller, (W) Web server 1. (A) An actor turns on the remote controller 2. (R) When the remote controller is turned on, it checks whether it is registered on the web server or not 3. (R) If it is not registered, it shows a page to the user to get related sweet heart's identification number 4. (A) An actor goes to a sweet heart and gets the sweet heart's identification number via the IR network 5. (A) An actor presses "send button" to send a request to register 6. (W) The web server registers the sweet heart on the database server 7. (W) The web server sends the result of the registration process to the remote controller 8. (R) A remote controller shows received result on the screen
Alternative courses of events	N/A
Exceptional courses of events	Line 7. If the web server fails to register it, indicate an error.

2131. Define Essential Use Cases

3. Receive machine identification number

Element	Description
Use case	Receive machine identification number
Actor	Owner
Purpose	Make a relationship between a remote controller and sweet heart
Overview	Receive machine identification number from sweet heart to register a relationship between sweet heart and remote controllers on the web server.
Type	Primary and Essential
Cross reference	Functions : R1.1.3 Use Cases : "Send machine identification number", "Receive machine identification number"
Pre-requisites	N/A
Typical courses of events	(A) Actor(Owner), (S) Sweet heart, (R) Remote controller 1. (A) An actor goes and tries to get sweet heart identification number by using the IR network. 2. (S) Sweet hearts are always sending IR message contains its identification number without any request. 3. (R) A remote controller receives the identification number from the sweet heart via IR network. 4. (R) A remote controller shows received identification number on the screen.
Alternative courses of events	N/A
Exceptional courses of events	N/A

2131. Define Essential Use Cases

4. Save personal information

Element	Description
Use case	Save personal information
Actor	Owner
Purpose	Save information for making a recommendation on coffee
Overview	Save personal information including his or her preferences such as preferred coffee beans, sugar portion in the coffee on the web server.
Type	Primary and Essential
Cross reference	Functions : R1.2.1 Use Cases : "Save personal information", Relaying use cases : "Relay save personal information","Process save personal information"
Pre-requisites	The controller should be registered on the web sever before.
Typical courses of events	(A) Actor, (R) Remote controller, (W) Web server 1. (A) An actor inputs personal information on the remote controller 2. (R) A remote controller sends information to the web server 3. (W) The web server saves the information 4. (W) The web server sends the result 5. (R) A remote controller shows received result on the screen.
Alternative courses of events	N/A
Exceptional courses of events	Line 3. If the web server fails to save the information, indicate an error.

2131. Define Essential Use Cases

5. Update personal information

Element	Description
Use case	Update personal information
Actor	Owner
Purpose	Update information for making a recommendation on coffee
Overview	Update personal information including his or her information
Type	Primary and Essential
Cross reference	Functions : R.1.2.2 Use Cases : "Update personal information", Relaying use-cases : "Relay update personal information","Process update personal information"
Pre-requisites	The controller should be registered on the web sever before.
Typical courses of events	(A) Actor, (R) Remote controller, (W) Web server 1. (A) An actor inputs personal information on the remote controller 2. (R) A remote controller sends information to the web server 3. (W) The web server updates the information 4. (W) The web server sends the result 5. (R) A remote controller shows received result on the screen.
Alternative courses of events	N/A
Exceptional courses of events	Line 3. If the web server fails to save the information, indicate an error.

2131. Define Essential Use Cases

6. Reset saved records

Element	Description
Use case	Reset saved records
Actor	Owner
Purpose	Initialize learning system by deleting all previously saved user's decisions
Overview	Delete all and initialize the saved user's past decision on the database.
Type	Primary and Essential
Cross reference	Functions : R1.2.3 Use Cases : "Reset saved record" Relaying use-cases : "Relay reset saved records","Process reset saved records"
Pre-requisites	The controller should be registered on the web sever before.
Typical courses of events	(A) Actor, (R) Remote controller, (W) Web server 1. (A) An actor presses "Reset saved records" button on the remote controller 2. (R) A remote controller sends a request to reset all saved records to the web server 3. (W) The web server deletes all saved records 4. (W) The web server sends the result 5. (R) A remote controller shows received result on the screen.
Alternative courses of events	N/A
Exceptional courses of events	Line 3. If the web server fails to reset all saved records, indicate an error.

2131. Define Essential Use Cases

7. Choose coffee to recommend

Element	Description
Use case	Choose coffee to recommend
Actor	Remote Controller
Purpose	Determine what coffee to recommend
Overview	Make a decision on the recommended coffee based on saved owner's preference, weather, bio-rhythm, special day.
Type	Primary and Essential
Cross reference	Functions : R1.3.1 Use Cases :, "Choose coffee to recommend" Relaying use-cases : "Turn On", "GetUserDecisions"
Pre-requisites	All registration processes should be done before.
Typical courses of events	(A) Actor(Remote controller), (W) Web server 1. (A) If the remote controller is not turned on, the user turns on the remote controller 2. (A) A remote controller sends a request to choose recommended coffee to the web server 3. (W) The web server gets information from the database server 4. (W) The web server chooses coffee to recommend based on various factors such as today's weather, the user's bio-rhythm and previous decisions. 5. (W) The web server saves chosen recommended coffee on the web server
Alternative courses of events	N/A
Exceptional courses of events	Line 2. If the web server has an error during choosing the coffee to recommend, indicate an error.

2131. Define Essential Use Cases

8. Request all menus with recommended coffee

Element	Description
Use case	Request all menus with recommended coffee
Actor	Owner
Purpose	Request all menus with recommended coffee to the user
Overview	Request all available menus with the recommended coffee chosen by use-case number 7.
Type	Primary and Essential
Cross reference	Functions : R1.3.2 Use Cases : "Request all menus with recommended coffee" Relaying use-cases : "Send Menu information"
Pre-requisites	All registration processes should be done before.
Typical courses of events	(A) Actor(Owner), (R) Remote controller, (W) Web server 1. (A) An actor turns on a remote controller 2. (R) A remote sends a request to the web server in order to get all information about all menus controller with recommended coffee 3. (W) The web server sends requested information 4. (R) A remote controller shows received information, requested before, on the screen.
Alternative courses of events	N/A
Exceptional courses of events	Line 4. If a remote controller fails to receive information from the web server, indicate an error.

2131. Define Essential Use Cases

9. Select size of coffee

Element	Description
Use case	Select size of coffee
Actor	Owner
Purpose	Give an option on size of coffee to users
Overview	Select size of coffee. The size of coffee in this machine should be one of the following list, Short, Tall and Grande.
Type	Primary and Essential
Cross reference	Functions : R1.3.3 Use Cases : "Select size of coffee"
Pre-requisites	All registration processes should be done before.
Typical courses of events	(A) Actor(Owner), (R) Remote controller 1. (A) Select size of coffee by pressing the button on the screen in a remote controller 2. (R) A remote controller saves selected size of coffee on the remote controller temporary 3. (R) A remote controller moves on to the next page to select portion of water
Alternative courses of events	N/A
Exceptional courses of events	Line 2. If a remote controller fails to saves selected size of coffee temporary, indicate an error.

2131. Define Essential Use Cases

10. Select portion of water

Element	Description
Use case	Select portion of water
Actor	Owner
Purpose	Give an option on size of coffee to users
Overview	User can increase and decrease based on the default amount of water in the coffee.
Type	Primary and Essential
Cross reference	Functions : R1.3.4 Use Cases : "Select portion of water"
Pre-requisites	All registration processes should be done before.
Typical courses of events	(A) Actor(Owner), (R) Remote controller 1.　(A) An actor selects portion of water by pressing the button on the screen in a remote controller 2.　(R) A remote controller saves selected portion of water on the remote controller temporary 3.　(R) A remote controller moves on to the next page to confirm ordered coffee
Alternative courses of events	N/A
Exceptional courses of events	Line 2. If a remote controller fails to saves selected portion of water temporary, indicate an error.

2131. Define Essential Use Cases

11. Confirm ordered coffee

Element	Description
Use case	Confirm ordered coffee
Actor	Owner
Purpose	Make sure users' selection before start to make a cup of coffee
Overview	Confirm before making a cup of coffee based on the selected options.
Type	Primary and Essential
Cross reference	Functions : R1.4.1 Use Cases : "Confirm ordered coffee",,"Save user's decision", "Choose music to recommend" Relaying use-cases : "Make ordered coffee"
Pre-requisites	All registration processes should be done before.
Typical courses of events	(A) Actor(Owner), (R) Remote controller, (W) Web server 1. (A) An actor checks all information on the screen and presses "Confirm" button to order a cup of coffee 2. (R) A remote controller sends a request to the web sever 3. (R) A remote controller sends a request to the sweet heart to order a cup of coffee 4. (W) The web server invokes "Save user's decision" 5. (W) The web server sends a result message to the remote controller 6. (R) A remote controller shows a result from the web server to the user
Alternative courses of events	N/A
Exceptional courses of events	N/A

2131. Define Essential Use Cases

12. Cancel ordered coffee

Element	Description
Use case	Cancel ordered coffee
Actor	Owner
Purpose	Allow an user to cancel ordered coffee even if it is in process of making.
Overview	Cancel ordered coffee
Type	Primary and Essential
Cross reference	Functions : R1.4.2 Use Cases : "Cancel ordered coffee"
Pre-requisites	This use-case should be issued during the sweet heart is making a cup of coffee
Typical courses of events	(A) Actor(Owner), (R) Remote controller, (S) Sweet heart 1. (A) An actor presses "Cancel" button on a remote controller 2. (R) A remote controller sends a request to the sweet heart to cancel ordered coffee. 3. (R) A remote controller sends a request to the web server to let the server know the ordered coffee is cancelled 4. (S) The sweet heart sends a result message to the remote controller 5. (R) A remote controller shows a result to the user
Alternative courses of events	N/A
Exceptional courses of events	N/A

2131. Define Essential Use Cases

13. Show remained materials

Element	Description
Use case	Show remained materials
Actor	Remote Controller
Purpose	Show remained ingredient to let users know what ingredients are needed to
Overview	Show amount of remained ingredients. If one of the ingredient is insufficient, shows the alarm message to the user.
Type	Primary and Essential
Cross reference	Functions : R1.5 Use Cases : "Show remained material", Relaying use-cases : "Request to check remained materials","Send remained materials information"
Pre-requisites	All registration processes should be done before.
Typical courses of events	(A) Actor(Remote Controller), (R) Remote controller, (S) Sweet heart 1.　(R) A remote controller sends a request to the sweet heart to checks remained ingredients 2.　(S) The sweet heart sends a response to the remote controller 3.　(R) A remote controller shows the received result
Alternative courses of events	N/A
Exceptional courses of events	N/A

2131. Define Essential Use Cases

14. Show recommended music

Element	Description
Use case	Show recommended music
Actor	Web server
Purpose	Recommend the music for today to make a good atmosphere
Overview	Recommend the music to play during the coffee break.
Type	Primary and Essential
Cross reference	Functions : R1.6.1 Use Cases : "Show recommended music",, "Choose music to recommend", "Confirm ordered coffee" Relaying use-cases : "Send recommended music", "Make ordered coffee"
Pre-requisites	All registration processes should be done before.
Typical courses of events	(A) Actor(Web server), (R) Remote controller 1. (A) The web server chooses the recommended music to play 2. (A) The web server sends a message to the remote controller 3. (R) A remote controller shows recommended music received from the web server
Alternative courses of events	N/A
Exceptional courses of events	Line 3. If a remote controller fails to receive appropriate message from the server, indicate an error.

2131. Define Essential Use Cases

15. Select music

| Element	Description
Use case	Select music
Actor	Owner
Purpose	Give options on list of music to users
Overview	Allow an user to select the music. Lists are shown by genres and generations.
Type	Primary and Essential
Cross reference	Functions : R1.6.2 Use Cases : "Select music" Relaying use-cases : "Send Music List"
Pre-requisites	All registration processes should be done before.
Typical courses of events	(A) Actor(Owner), (R) Remote controller, (W) Web server 1. (A) An actor browses the file by selecting files on the screen of a remote controller 2. (R) If music lists are required (not exist), request the music lists to the web server 3. (W) The web server sends music lists to requested remote controller 4. (R) A remote controller saves current folder and currently selected file temporary on the remote controller.
Alternative courses of events	N/A
Exceptional courses of events	N/A

2131. Define Essential Use Cases

16. Play music

Element	Description
Use case	Play music
Actor	Owner
Purpose	Play selected music in the sweet heart
Overview	Play selected music
Type	Primary and Essential
Cross reference	Functions : R1.6.3 Use Cases : "Play music", "Save user's decision", "Confirm ordered coffee" Relaying use-cases : "Process play selected music", "Send music file"
Pre-requisites	The user should select a music to play before pressing the play button
Typical courses of events	(A) Actor(Owner), (R) Remote controller, (S) Sweet heart, (W) Web server 1. (A) An actor presses "Play" button on the remote controller 2. (R) A remote controller sends a request to the web server to make the sweet heart play a music 3. (W) The web server sends a music file to the sweet heart 4. (W) The web server sends a request to the sweet heart to play a music 5. (W) The web server invokes "Save user's decision" 6. (S) The sweet heart plays received music
Alternative courses of events	N/A
Exceptional courses of events	Line 3. If a remote controller fails to sends a file to the sweet heart, indicate an error. Line 4. If a remote controller fails to sends a request to the sweet heart, indicate an error.

2131. Define Essential Use Cases

17. Stop music

Element	Description
Use case	Stop music
Actor	Owner
Purpose	Allow an option to stop the music which is playing now
Overview	Stop the music which is playing now
Type	Primary and Essential
Cross reference	Functions : R1.6.4 Use Cases : "Stop music"
Pre-requisites	The sweet heart should be playing a music when this use-case is issued
Typical courses of events	(A) Actor(Owner), (R) Remote controller, (S) Sweet heart 1. (A) An actor presses "Stop" button on the remote controller 2. (R) A remote controller sends a request to the sweet heart to stop the music 3. (S) The sweet heart stop the music after receiving the stop message from a remote controller
Alternative courses of events	N/A
Exceptional courses of events	N/A

2131. Define Essential Use Cases

18. Change volume

Element	Description
Use case	Change volume
Actor	Owner
Purpose	Allow an option to change volume while it is playing a music
Overview	Change the system volume
Type	Primary and Essential
Cross reference	Functions : R1.6.5 Use Cases : "Change volume"
Pre-requisites	N/A
Typical courses of events	(A) Actor(Owner), (R) Remote controller, (S) Sweet heart 1. (A) An actor adjusts volume by using a remote controller 2. (R) A remote controller sends a request to the sweet heart to adjust volume 3. (S) The sweet heart changes the volume
Alternative courses of events	N/A
Exceptional courses of events	N/A

2131. Define Essential Use Cases

19. Save user's decision

Element	Description
Use case	Save user's decision
Actor	Web server
Purpose	Save user's decision on the database to use it later to determine recommend
Overview	This use case saves decisions from the Owner to the database on the web server. The following information will be saved. Selected coffee, size of coffee, amount of water in the coffee and information of chosen music.
Type	Primary and Essential
Cross reference	Functions : R1.7 Use Cases : "Save user's decision", "Confirm ordered coffee" Relaying use-cases : "Process play selected music"
Pre-requisites	N/A
Typical courses of events	(A) Actor(Web server) 1. (A) The web server saves user's decision on the database server when the user confirms coffee or selects a music to play. 2. (A) If the error occurs, save it to the web server as a log file, to review it later. 3. (A) If the error occurs, send a notification message to the remote controller to let the user know.
Alternative courses of events	N/A
Exceptional courses of events	Line 2. If the error occurs, save it in the web server and send a notification message to the remote controller.

2132. Refine Use case diagram
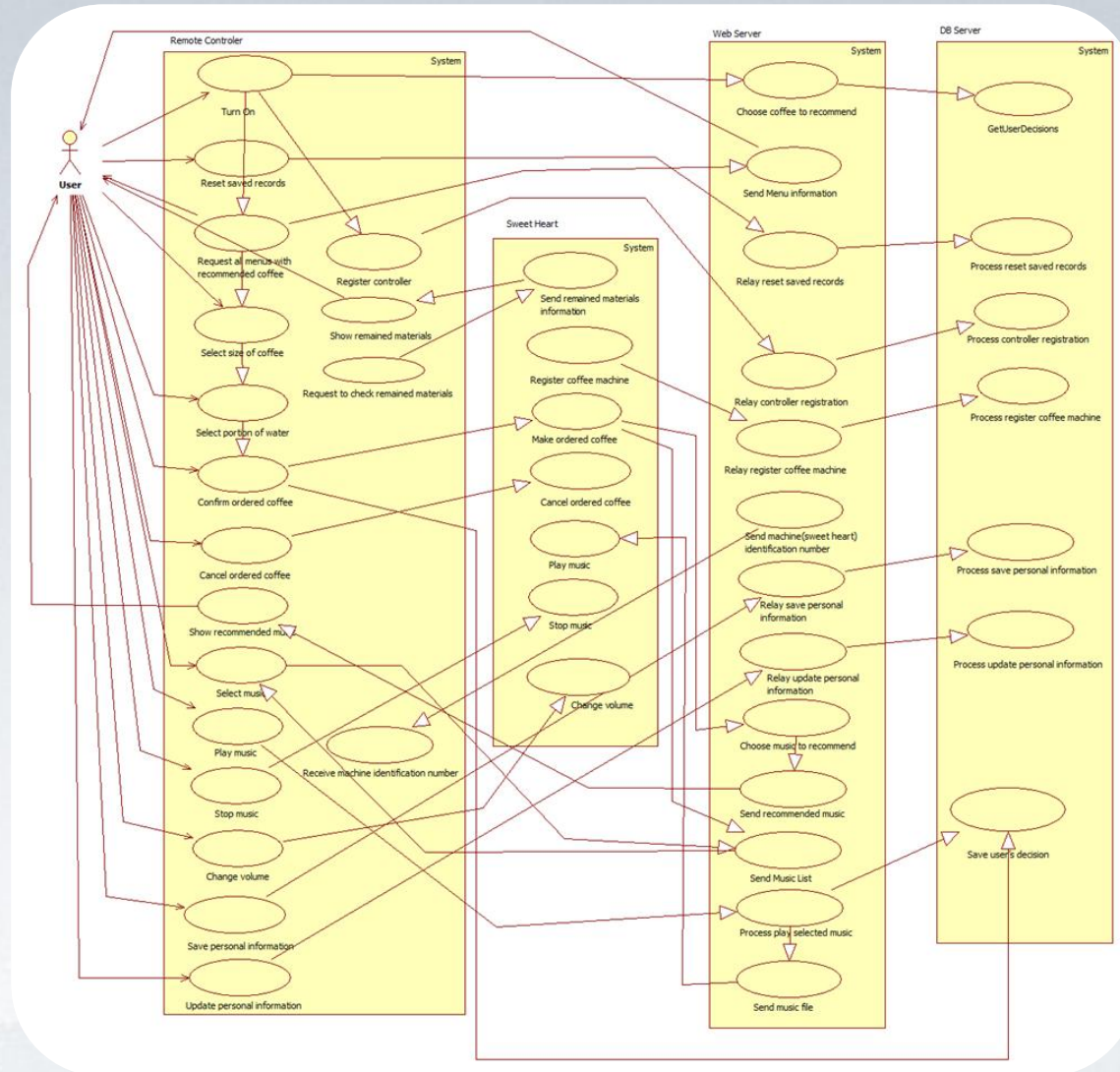
2133. Define Domain Model

- Concept Category List

Concept Category	Domain Class
Physical or tangible objects	Sweet heart, remote controller, web server, DB server
Specifications, designs, or descriptions of things	User
Places	N/A
Transactions	Saved decisions
Roles of people	User
Containers of other things	Music, Coffee, User, sweet heart
Things in a container	CoffeeName, size, water, musicname, genre, artist, identification number, name, sex, birth, specialday

2133. Define Domain Model

- Identify 'Concepts' in Domain

Sweet heart	Address	Registered sweet heart	Web server
Recommended coffee	volume	Music name	Database server
username	weather	Remained prime	user
Remained beans	Remained cream	Remained milk	Saved decisions
Identification number	Remote controller	music	coffee
genre	artist	Coffee name	size
water	name	sex	birthday

2133. Define Domain Model

– Assign class names into concepts

Sweet heart	Web server	DB server	Remote Controller

Music	Coffee	User	Saved decision

Registered remote controllers	Registered sweet heart

2133. Define Domain Model

– Identify and add associations
  – Use 'Association Category List'

Association Category	Associations
A is known/logged/recorded/reported/captured in B	Saved decision – Database server
A is a line item of B	Saved decision – Database server User – DB server
A is recorded in B	Saved decision – Database server
A is related to a transaction of B	Remote controller – Web server Remote controller – DB server
A is an organization submit of B	Music – Sweet heart Coffee – Sweet heart

2133. Define Domain Model

– Add Roles and Multiplicity

| Sweet heart | 0..* | Has/Have | 1 | Web server |

| Remote Controller | 0..* | Has/Have | 1 | Web server |

| Web server | 1 | Has/Have | 0..* | Music |
| | | | 0..* | Coffee |

DB server	1	Has/Have	0..*	Registered sweet heart
			0..*	Registered remote controllers
			0..*	User

2133. Define Domain Model

– Add Roles and Multiplicity

| Web server | — 1 —— Refer to —— 1 — | DB server |
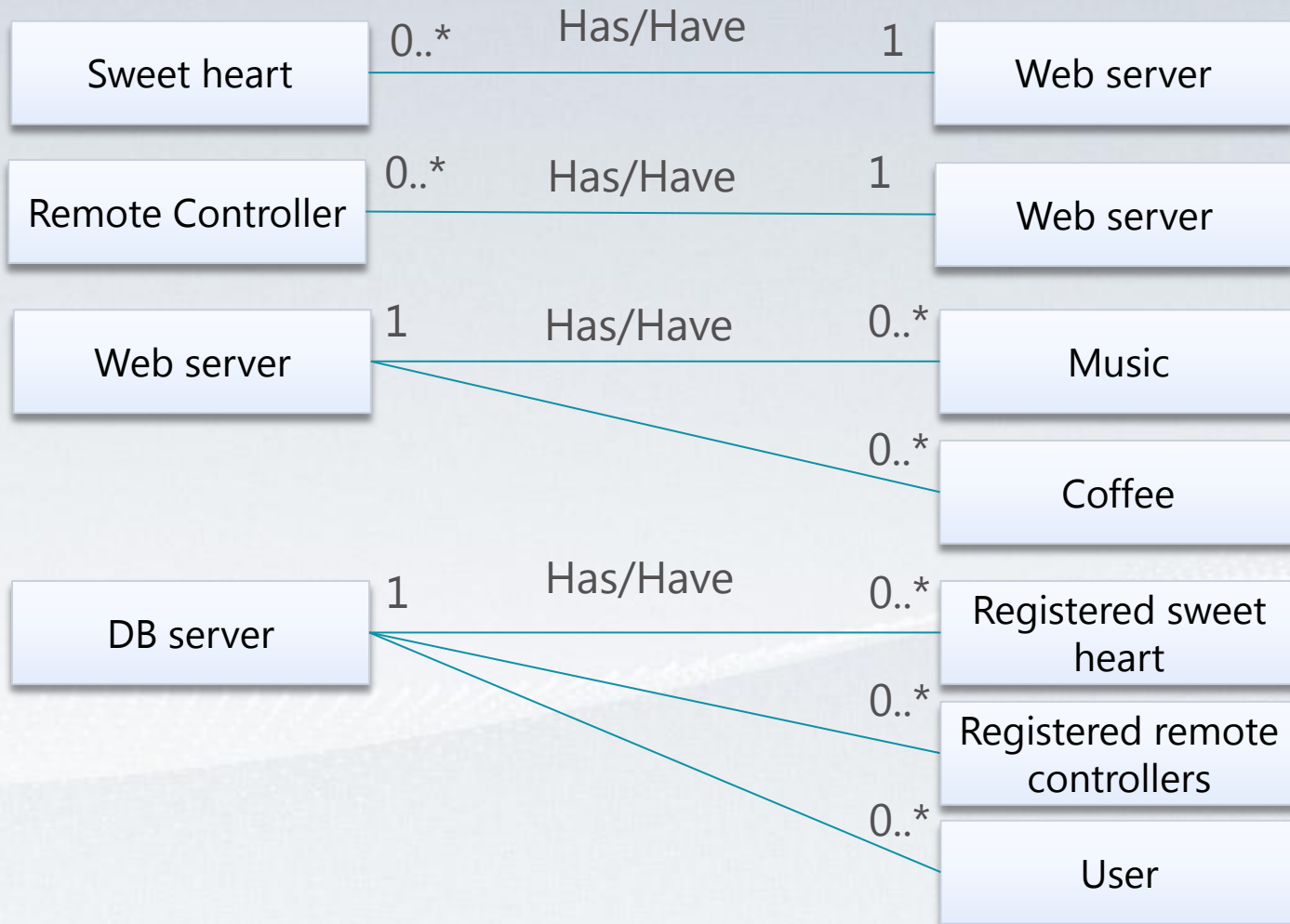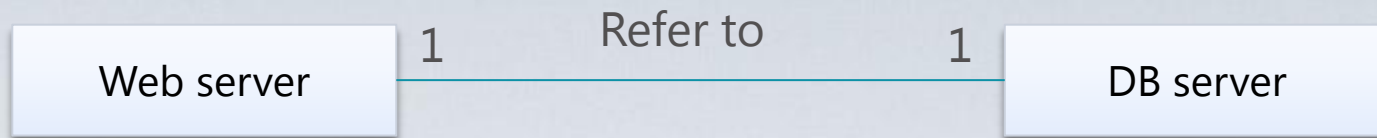
2133. Define Domain Model

– Attributes

Sweet Heart
+Identification number: integer
+RemainedBeans: Integer
+RemainedCream: Integer
+RemainedMilk: Integer
+RemainedPrime: Integer

Registered Remote Controllers
+Address : String
+UserName : String

Registered Sweet heart
+Identification Number : Integer
+Address : String

Web Server
+weather: string
+recommendedMusic: String
+recommendedCoffee: String
+Volume: Integer

DB Server

User
+name: string
+sex: string
+birth: string
+specialday: string

Music
+musicName:string
+genre:string
+artist:string

Coffee
+coffeeName: string
+size:string
+water:string

Saved decisions
+Selected Coffee: String
+Selected Music: String

Remote Controller
+WebserverAddress: String
+SweetheartAddress: String
+CurrentMusic: String
+SelectedCoffee: String
+SelectedAmountOfCoffee: Integer
+SelectedPortionOfWater: Integer
+UserName: String

2133. Define Domain Model
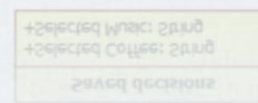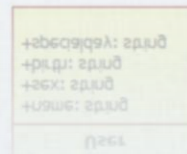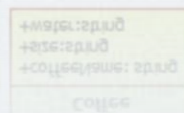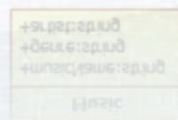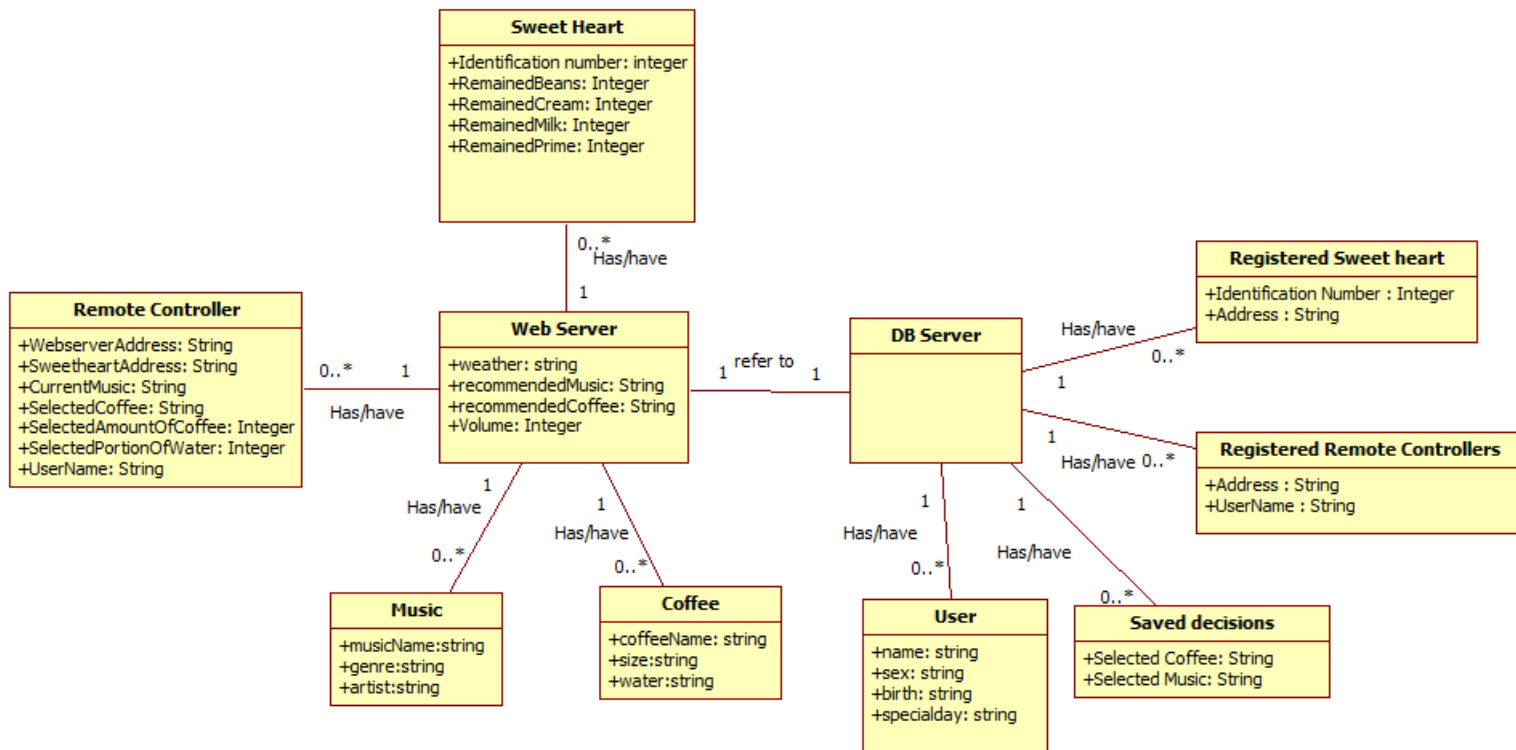
2134. Refine Glossary

Term	Category	Remarks
Sweet heart	Class	The coffee machine
Registered Remote Controllers	Class	Registered information of the remote controller on the web and database server
Registered Sweet heart	Class	Registered information of the sweet heart on the web and database server
Web server	Class	The web server organizes almost everything in this system
DB server	Class	The DB server saves users, remote controllers and sweet hearts information
User	Class	A person who owns the machine and uses this system
Music	Class	Music which will be played on the coffee machine
Coffee	Class	Coffee which will be made by users' commands
Saved decisions	Class	Saved records of users' patterns
Remote controller	Class	The controller which is used by the owner to control the sweet heart

2134. Refine Glossary

Term	Category	Remarks
Sweetheart.IdentificationNumber	Attribute	Identification number which is identical to each sweet heart
Sweetheart.RemainedBeans	Attribute	Information about remained bean in percent
Sweetheart.RemainedCream	Attribute	Information about remained cream in percent
Sweetheart.RemainedMilk	Attribute	Information about remained milk in percent
Sweetheart.RemainedPrime	Attribute	Information about remained prime in percent
RegisteredRemoteControllers.Address	Attribute	An address of the registered remote controller
RegisteredRemoteControllers.UserName	Attribute	An user name of the registered remote controller
RegisteredSweetheart.IndentificationNumber	Attribute	An identification number of the registered sweet heart
RegisteredSweetheart.Address	Attribute	An address of the registered sweet heart

2134. Refine Glossary

Term	Category	Remarks
WebServer.weather	Attribute	Weather information which is originally from the Internet
WebServer.recommendedMusic	Attribute	Recommended music which is selected by the system
WebServer.recommendedCoffee	Attribute	Recommended music which is selected by the system
WebServer.Volume	Attribute	Sound volume of the sweet heart
User.name	Attribute	Registered user name
User.sex	Attribute	Registered user's sex (Male, Female)
User.birth	Attribute	Registered user's birthday
User.specialday	Attribute	Registered user's special day
Music.musicName	Attribute	Title of a music
Music.genre	Attribute	Genre of a music
Music.artist	Attribute	Artist of a music
Coffee.coffeeName	Attribute	A representative coffee name such as Americano
Coffee.size	Attribute	A representative size of coffee such as Tall and Grande
Coffee.water	Attribute	Amount of water of the coffee

2134. Refine Glossary

Term	Category	Remarks
SavedDecisions.SelectedCoffee	Attribute	Record data of user's previous selections on coffee
SavedDecisions.SelectedMusic	Attribute	Record data of user's previous selections on music
RemoteController.WebserverAddress	Attribute	An address of the web server in a remote controller
RemoteController.SweetheartAddress	Attribute	An address of the sweet heart in a remote controller
RemoteController.CurrentMusic	Attribute	Currently selected music information on the remote controller which is temporary stored
RemoteController.SelectedCoffee	Attribute	Currently selected coffee information on the remote controller which is temporary stored
RemoteController.SelectedAmountOfCoffee	Attribute	Currently selected amount of coffee on the remote controller which is temporary stored
RemoteController.SelectedPortionOfWater	Attribute	Currently selected portion of water on the remote controller which is temporary stored
RemoteController.UserName	Attribute	An user name of the user of remote controller

2135. Define System Sequence Diagrams

1. Register coffee machine
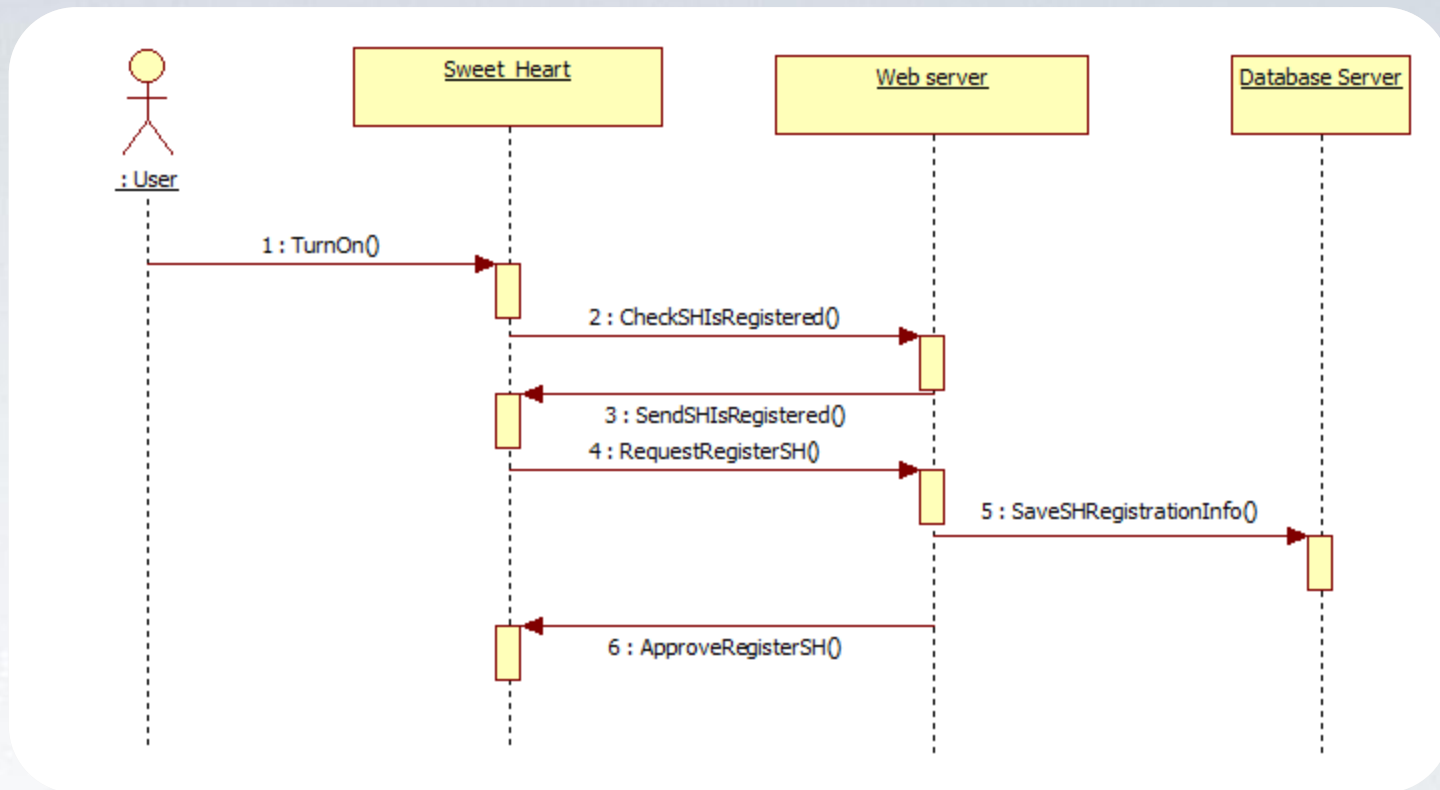
2135. Define System Sequence Diagrams

2. Register controller
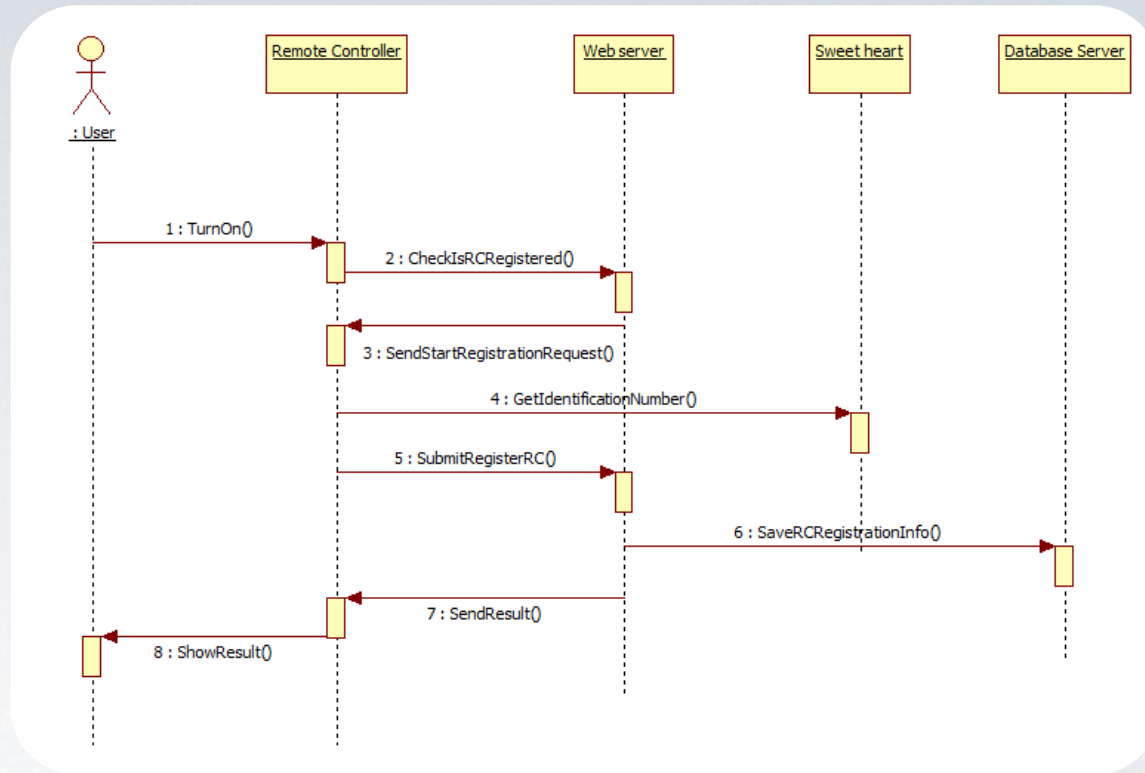
2135. Define System Sequence Diagrams

3. Receive machine identification number
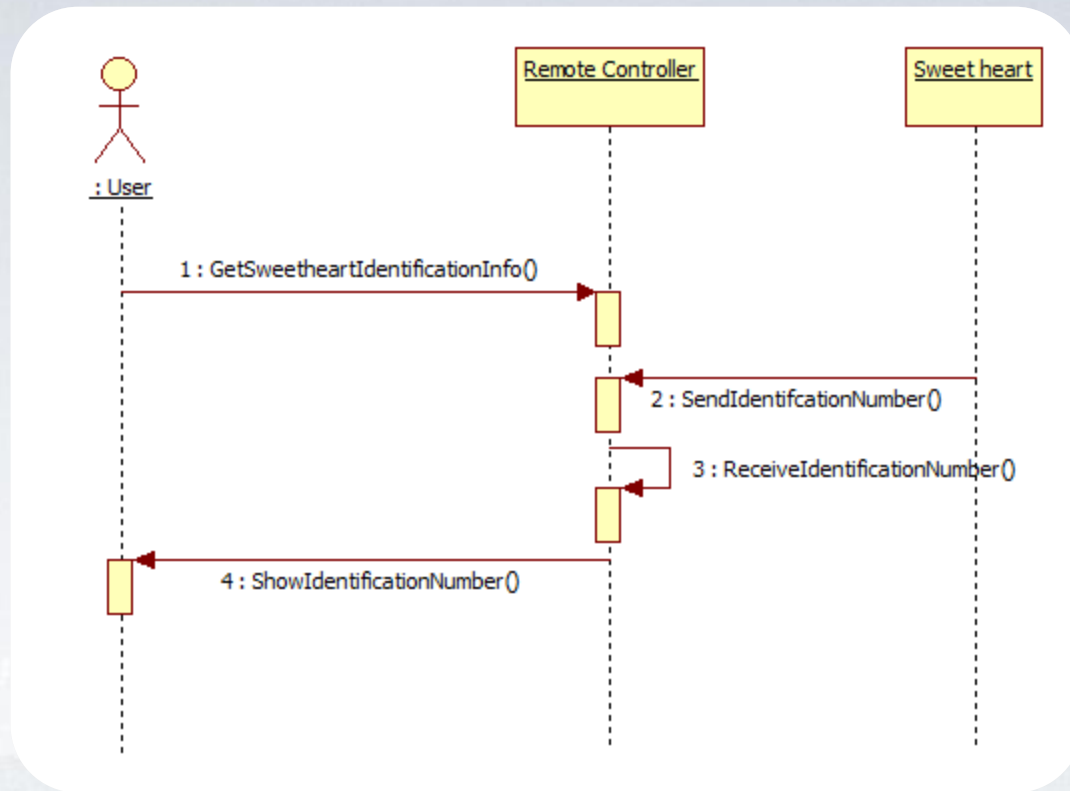
2135. Define System Sequence Diagrams

4. Save personal information
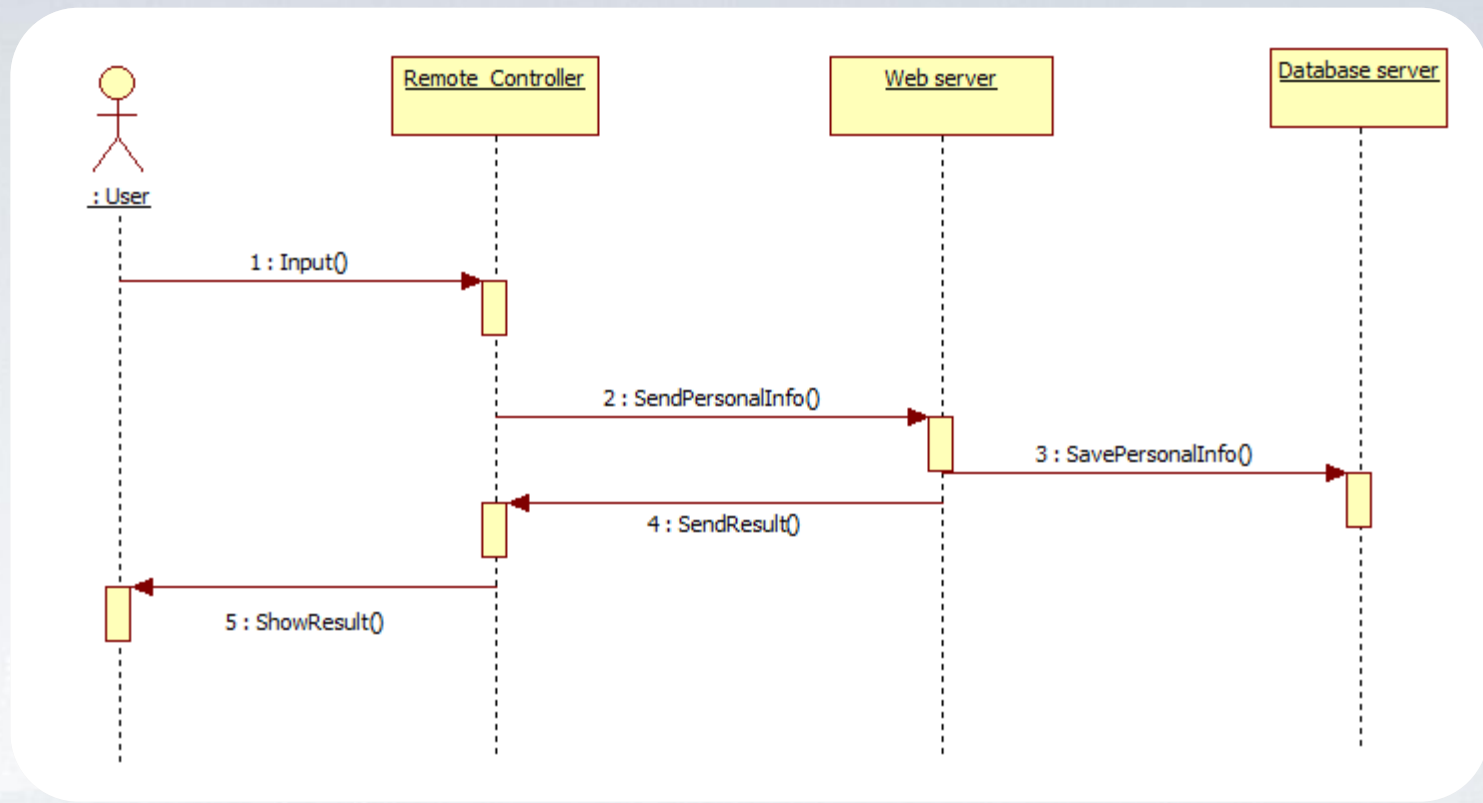
2135. Define System Sequence Diagrams

5. Update personal information
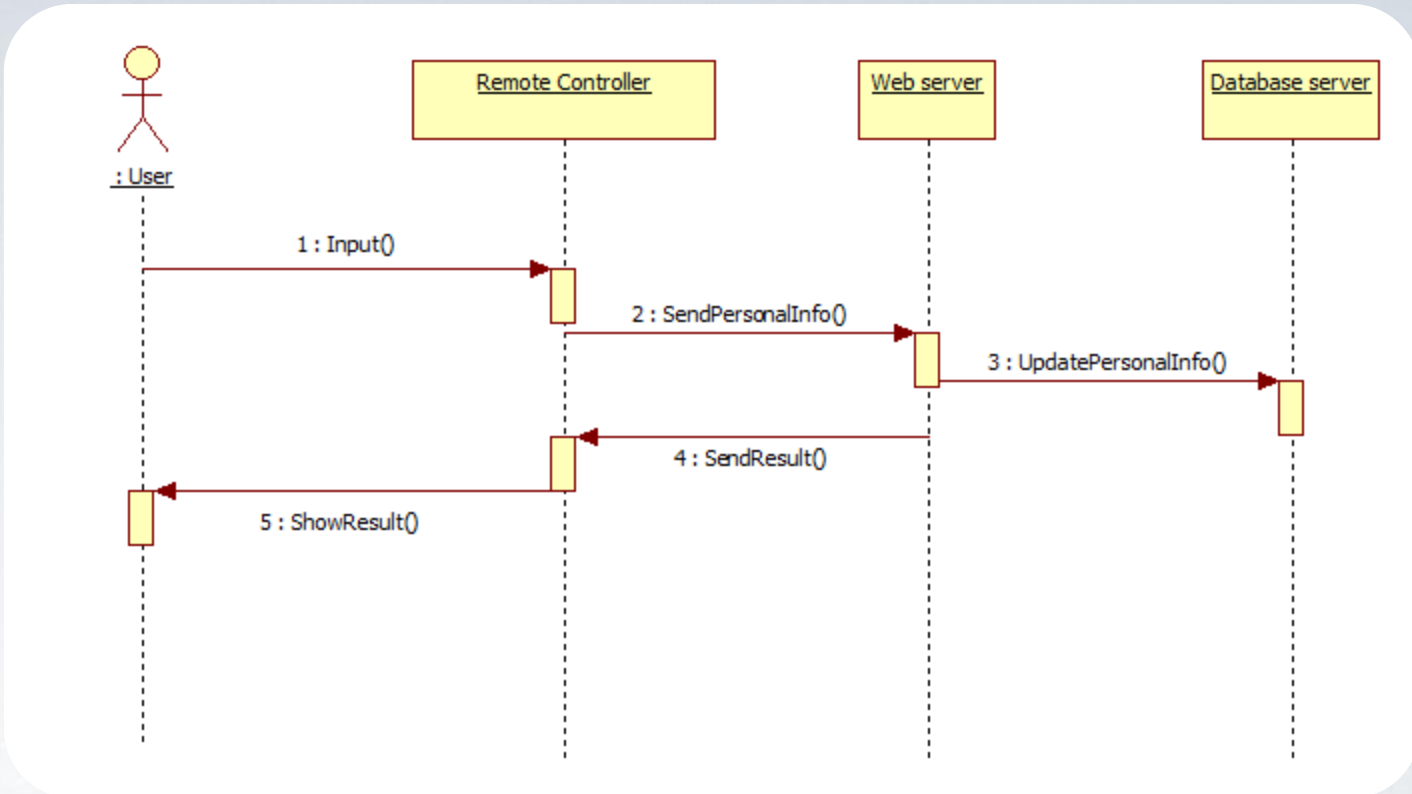
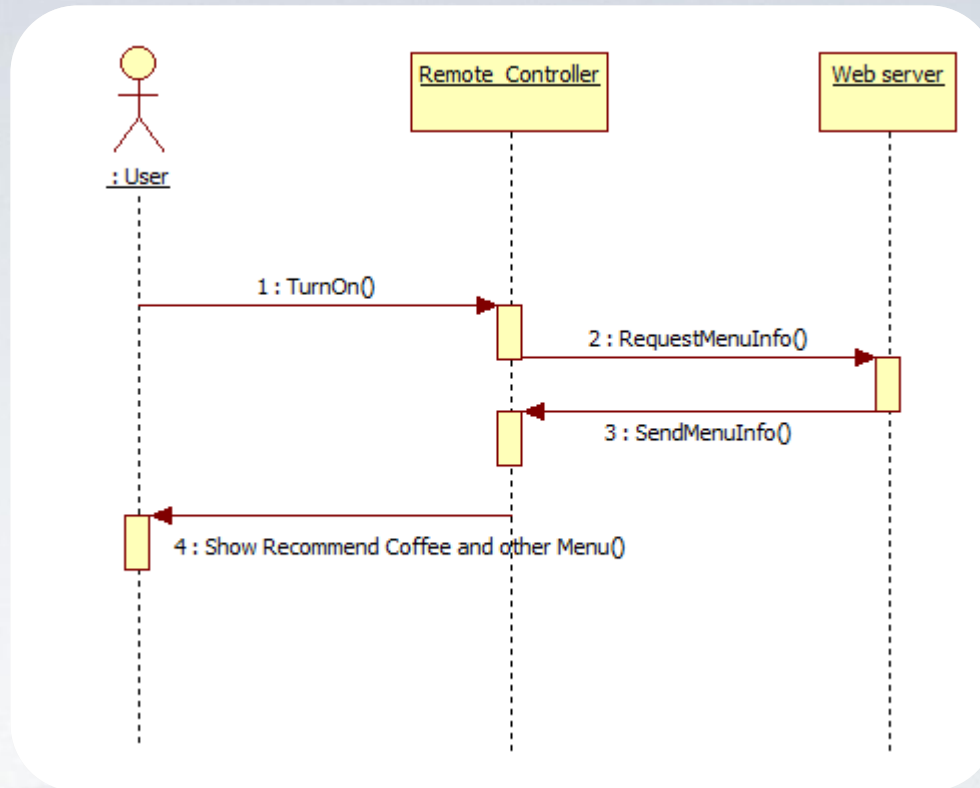# 2135. Define System Sequence Diagrams

6. Reset saved records
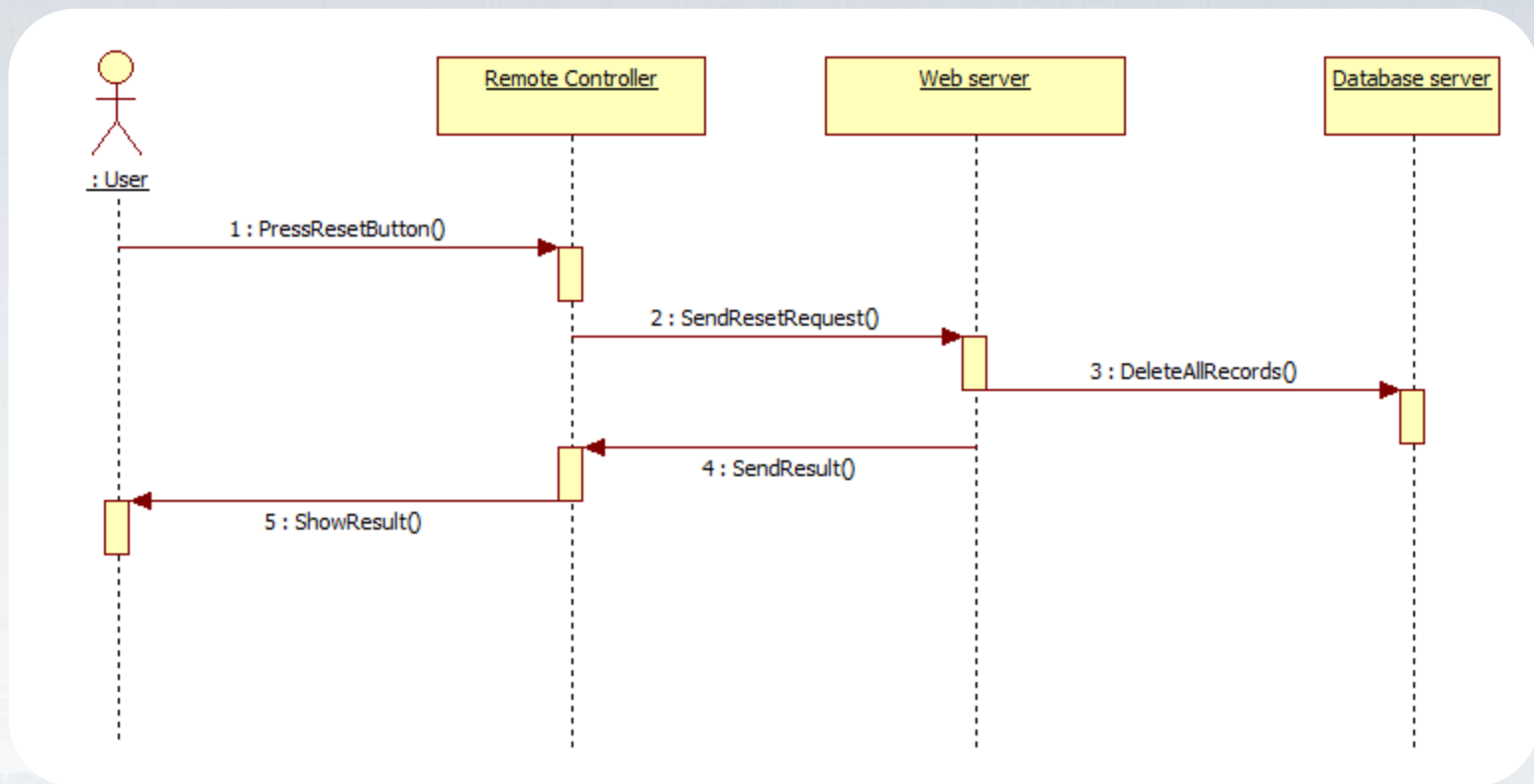
2135. Define System Sequence Diagrams

7. Choose coffee to recommend
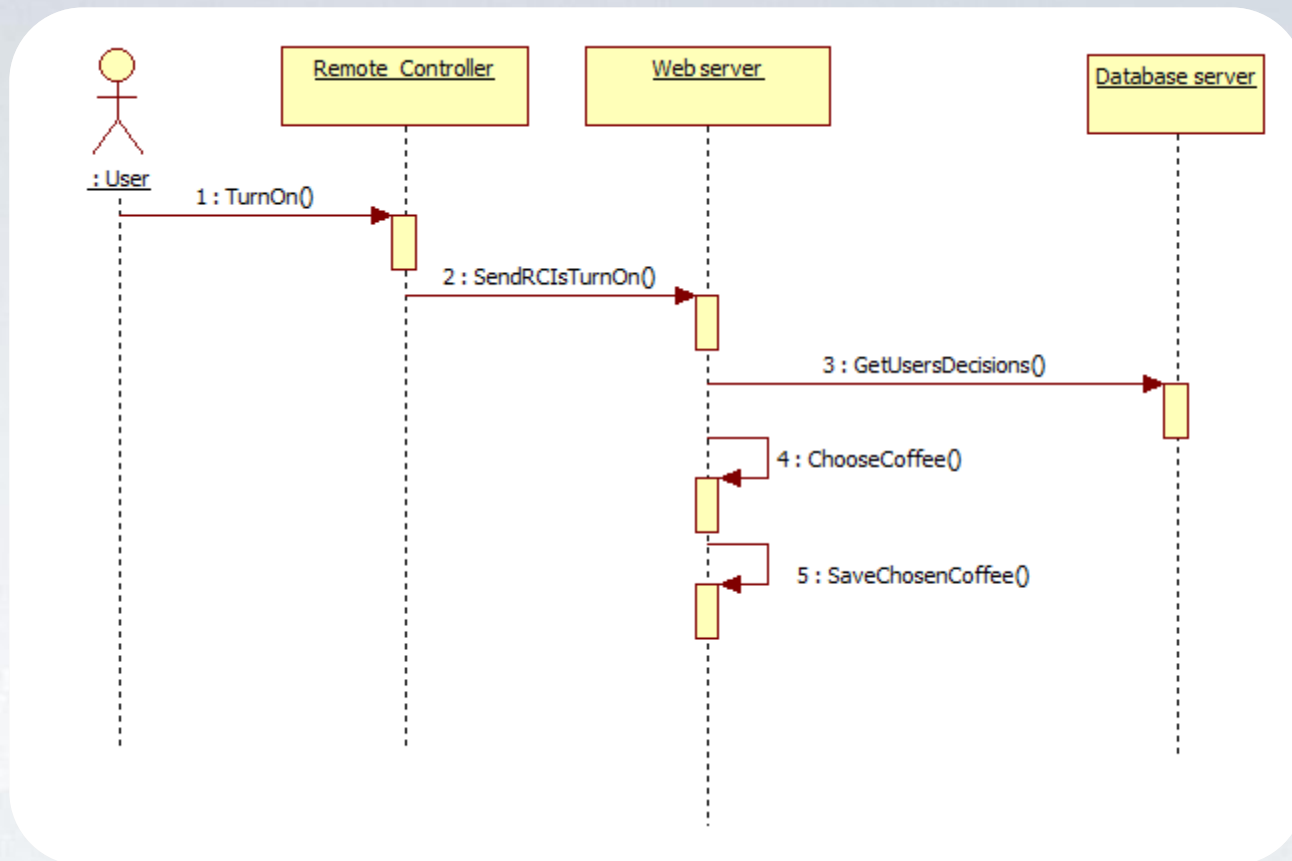
2135. Define System Sequence Diagrams

8. Request all menus with recommended coffee

2135. Define System Sequence Diagrams

9. Select size of coffee
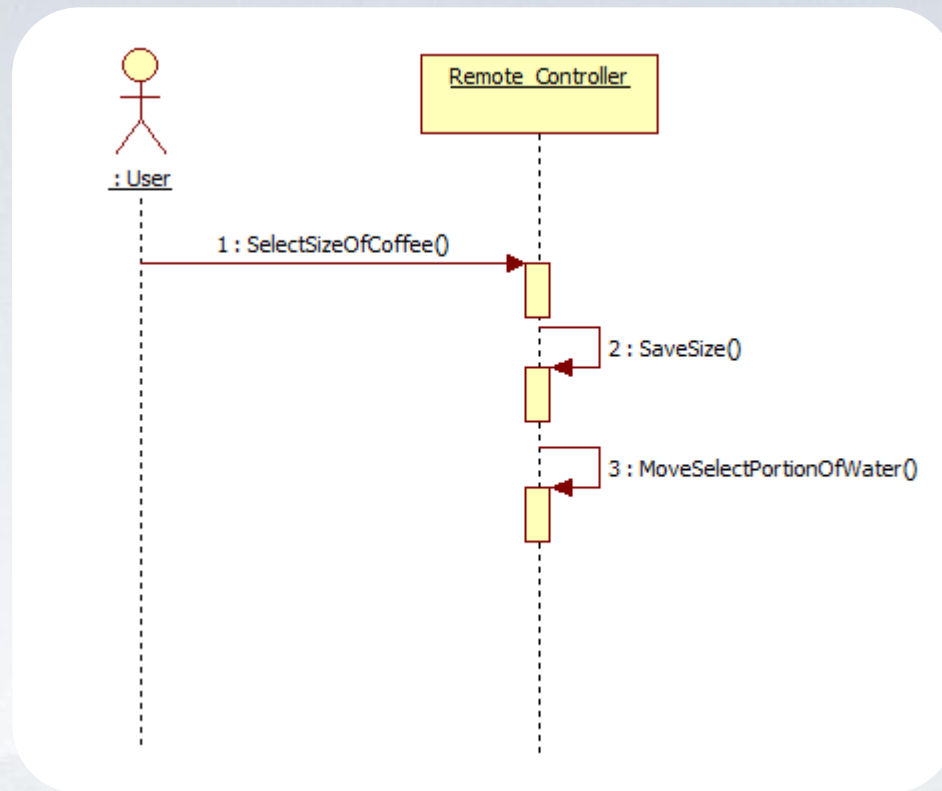
2135. Define System Sequence Diagrams

10. Select portion of water
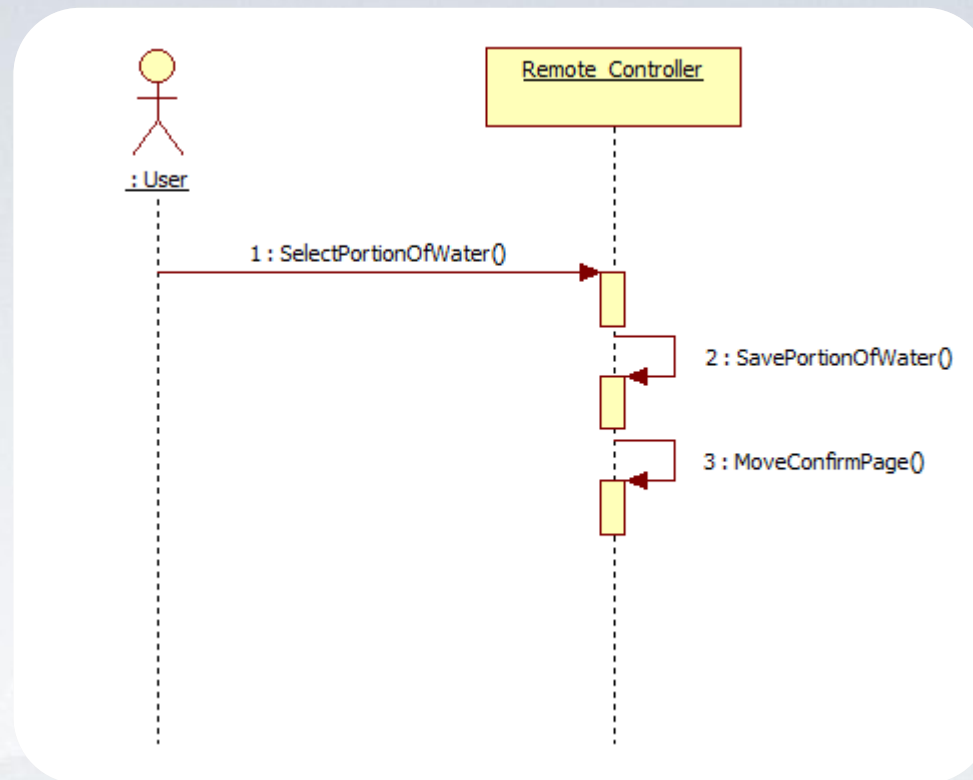
2135. Define System Sequence Diagrams

11. Confirm ordered coffee
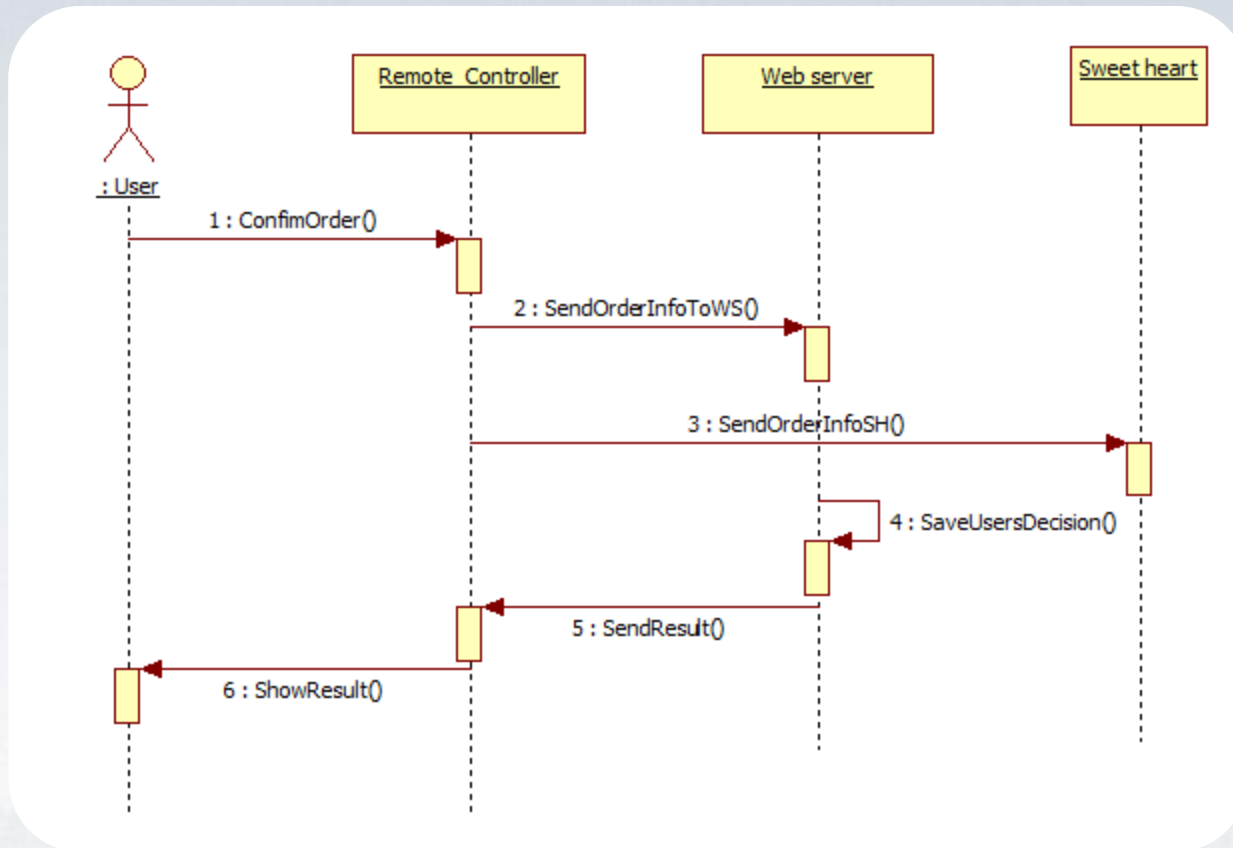
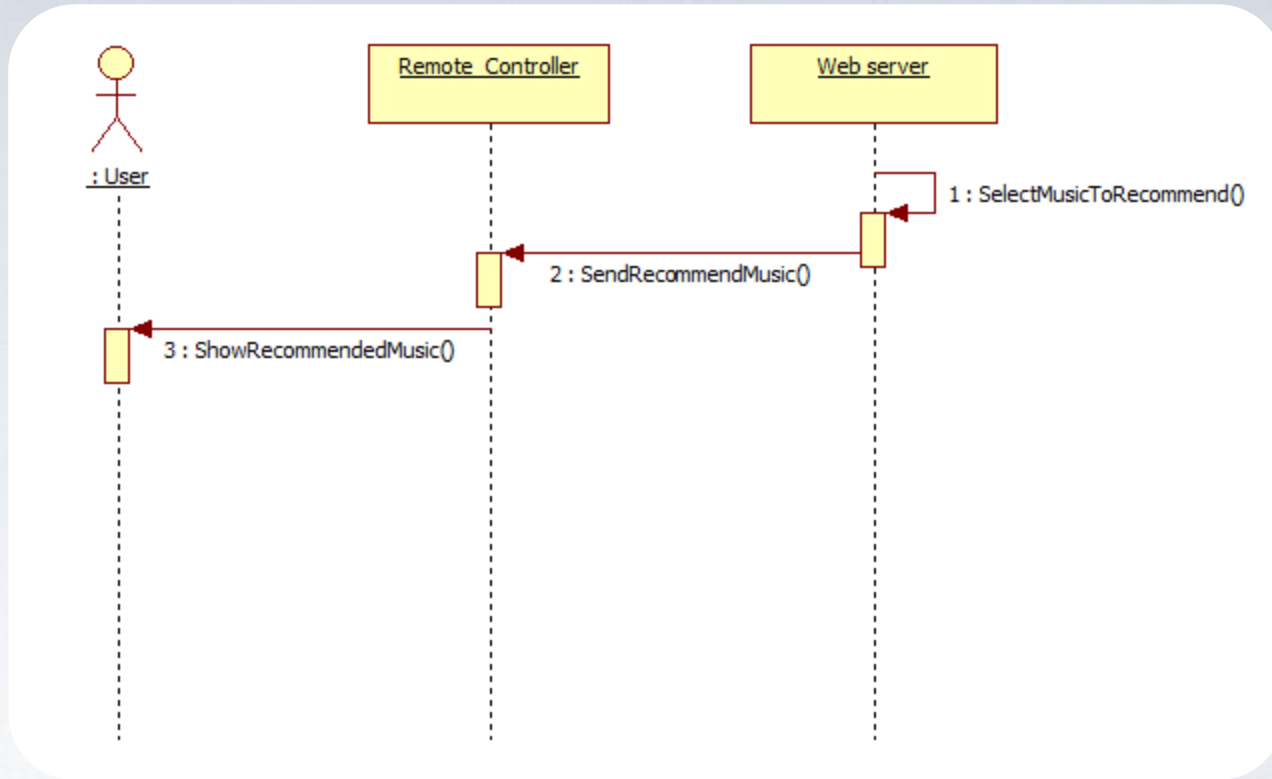# 2135. Define System Sequence Diagrams

12. Cancel ordered coffee
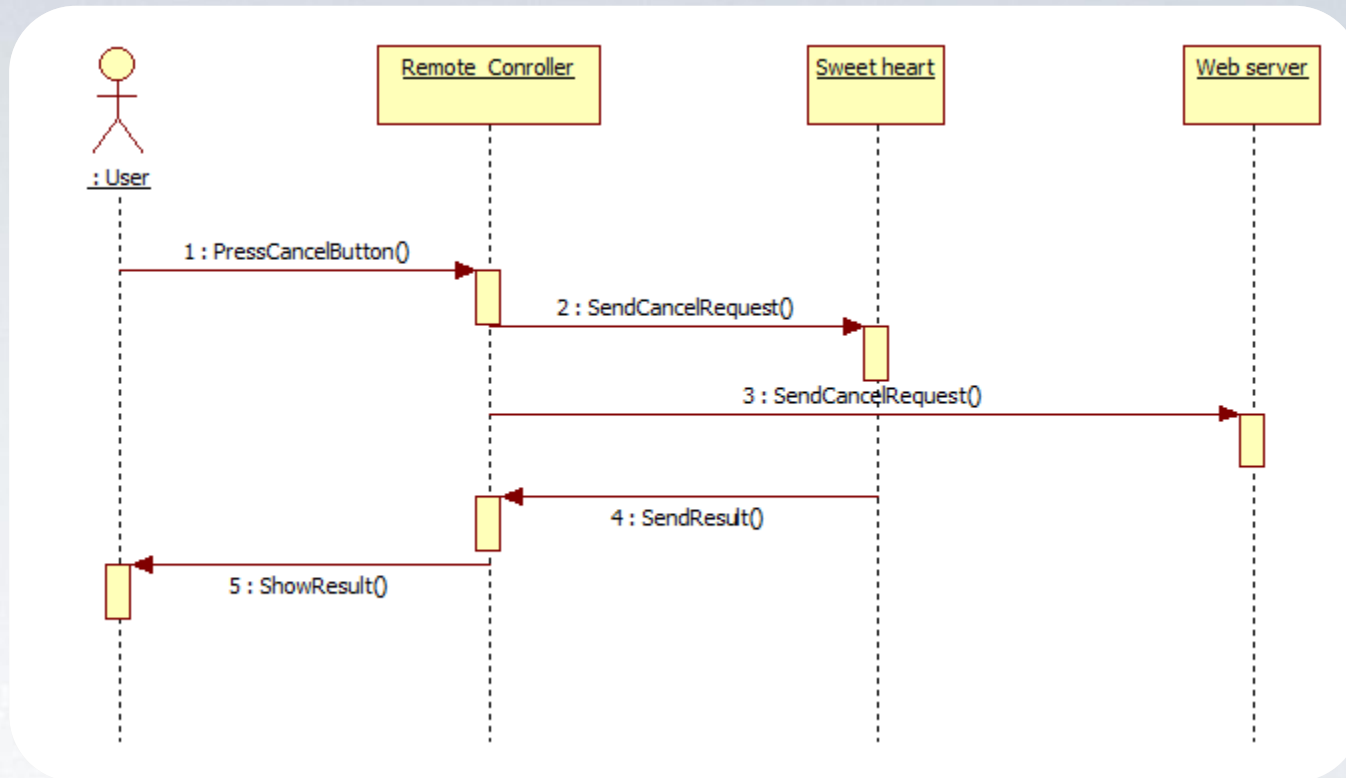
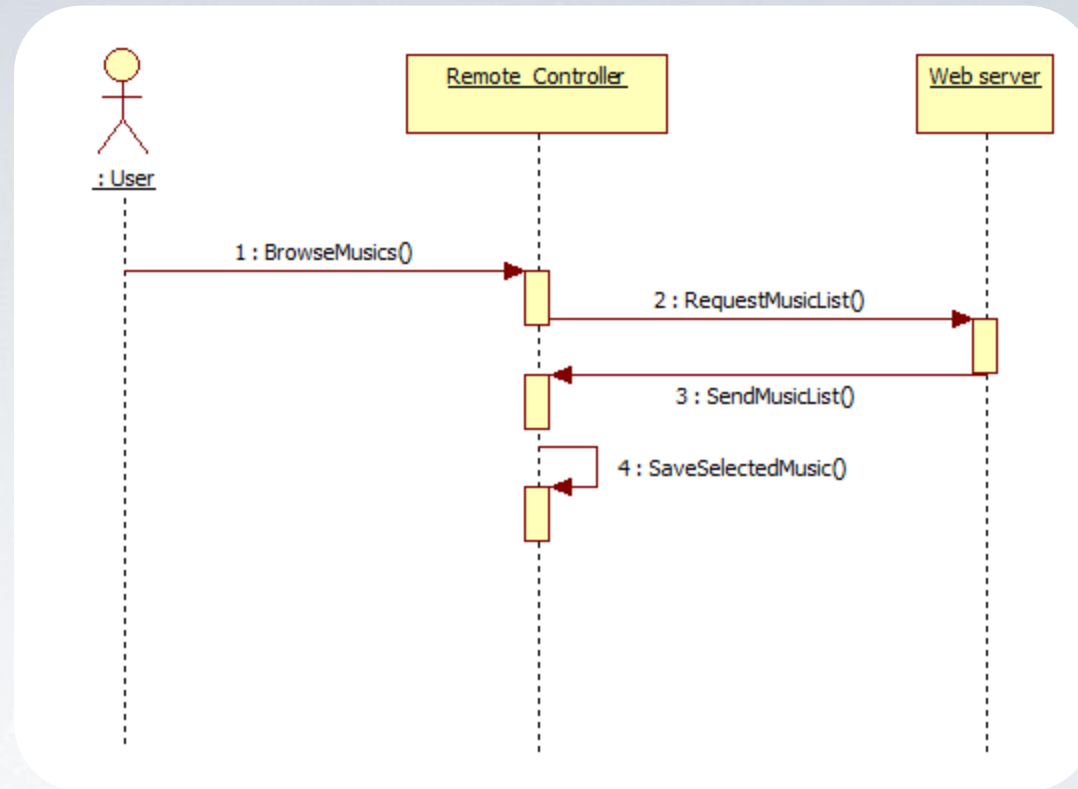# 2135. Define System Sequence Diagrams

13. Show remained materials
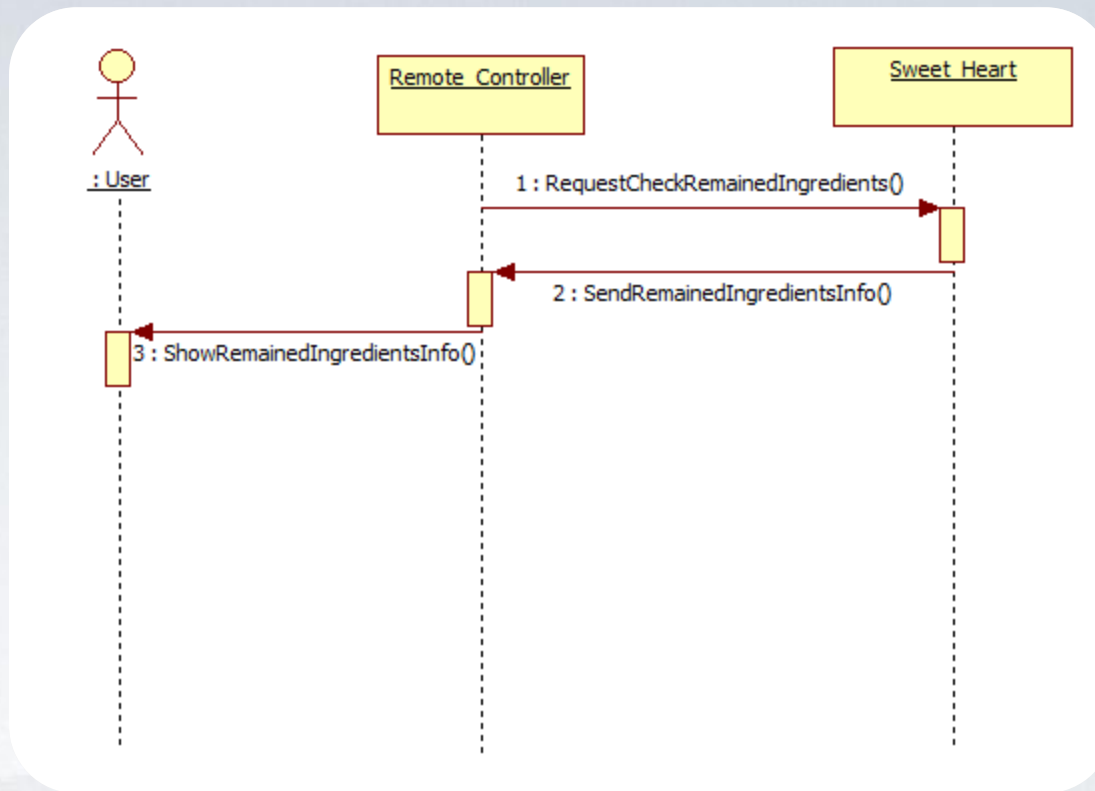
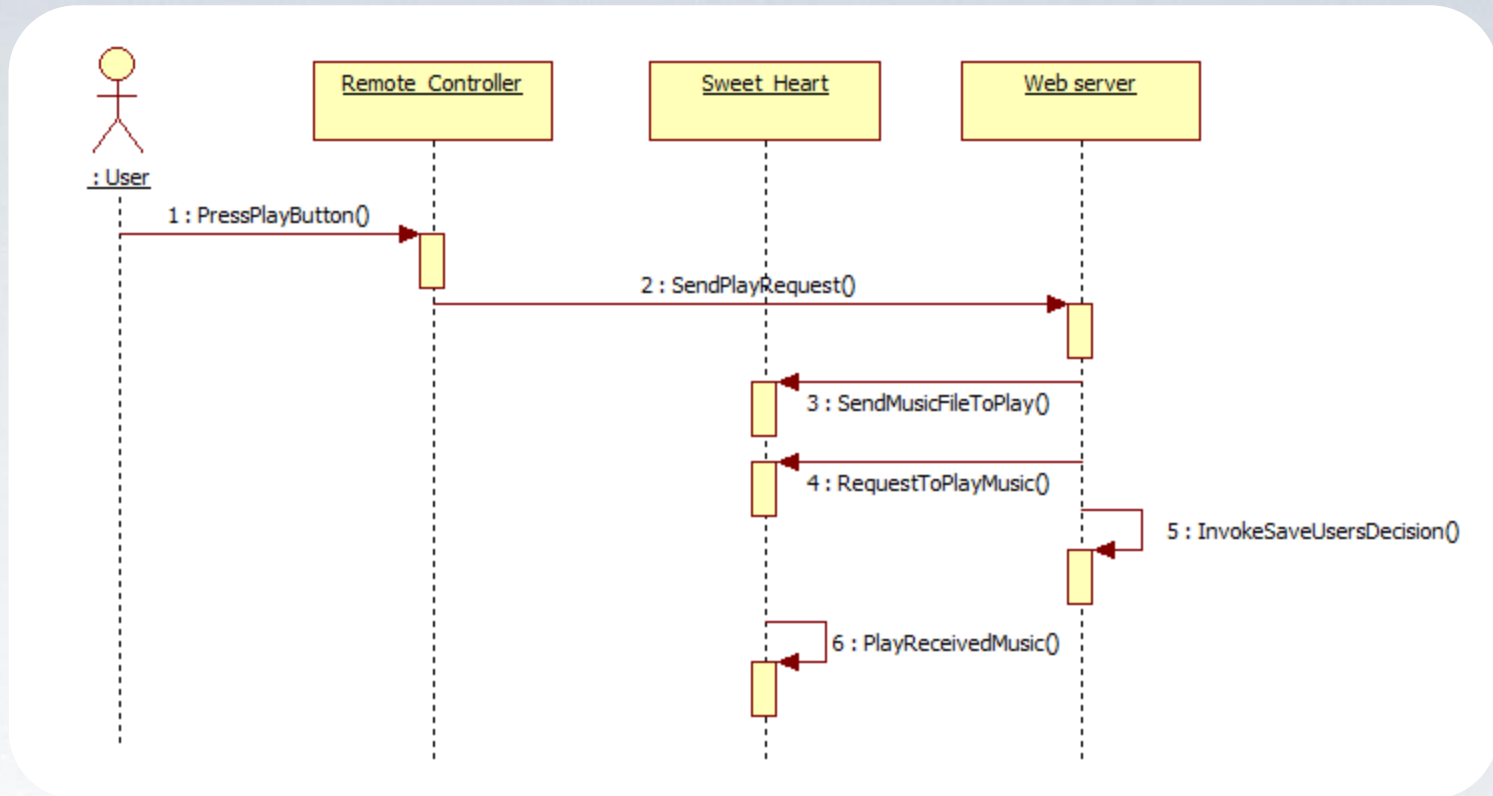# 2135. Define System Sequence Diagrams

14. Show recommended music

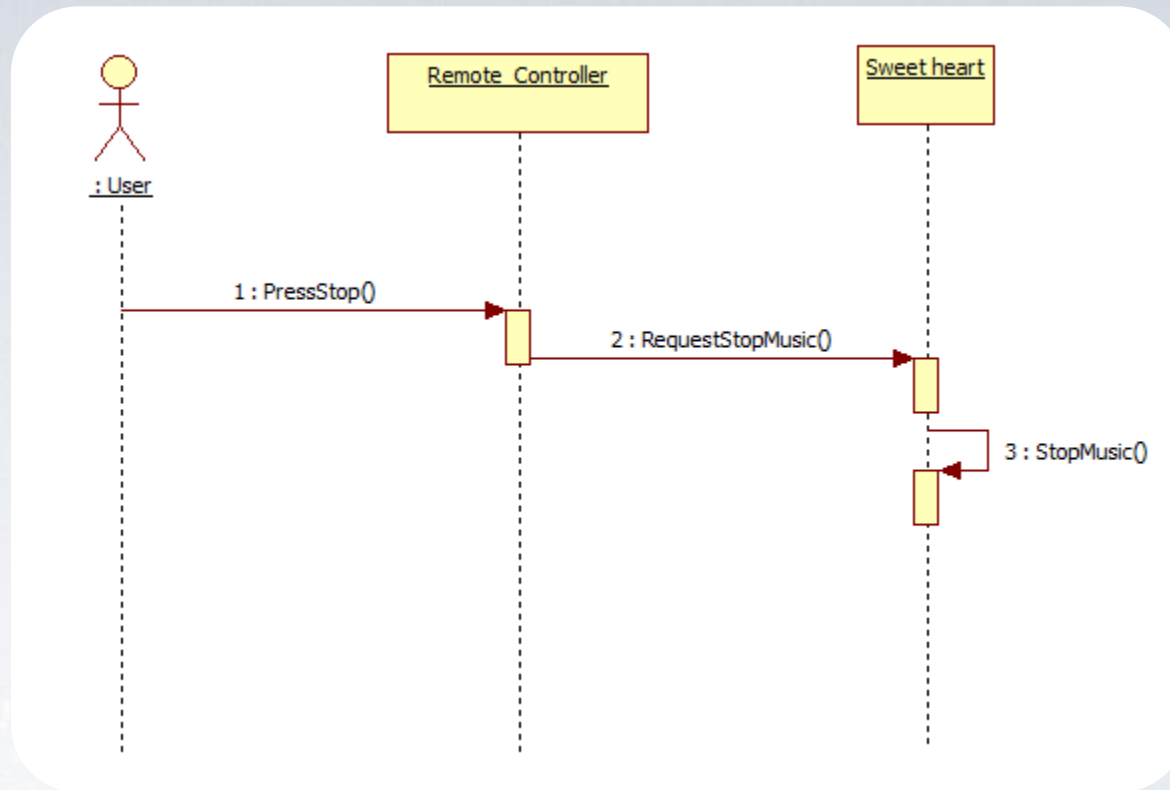# 2135. Define System Sequence Diagrams

15. Select music

2135. Define System Sequence Diagrams
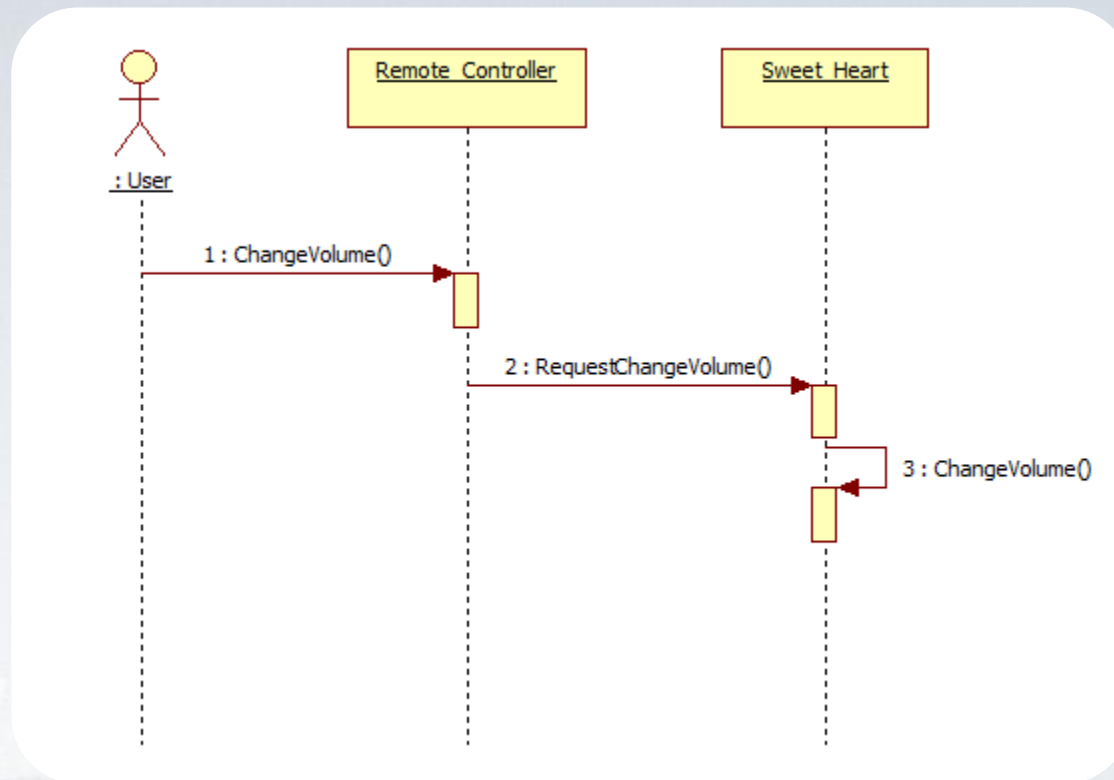
16. Play music
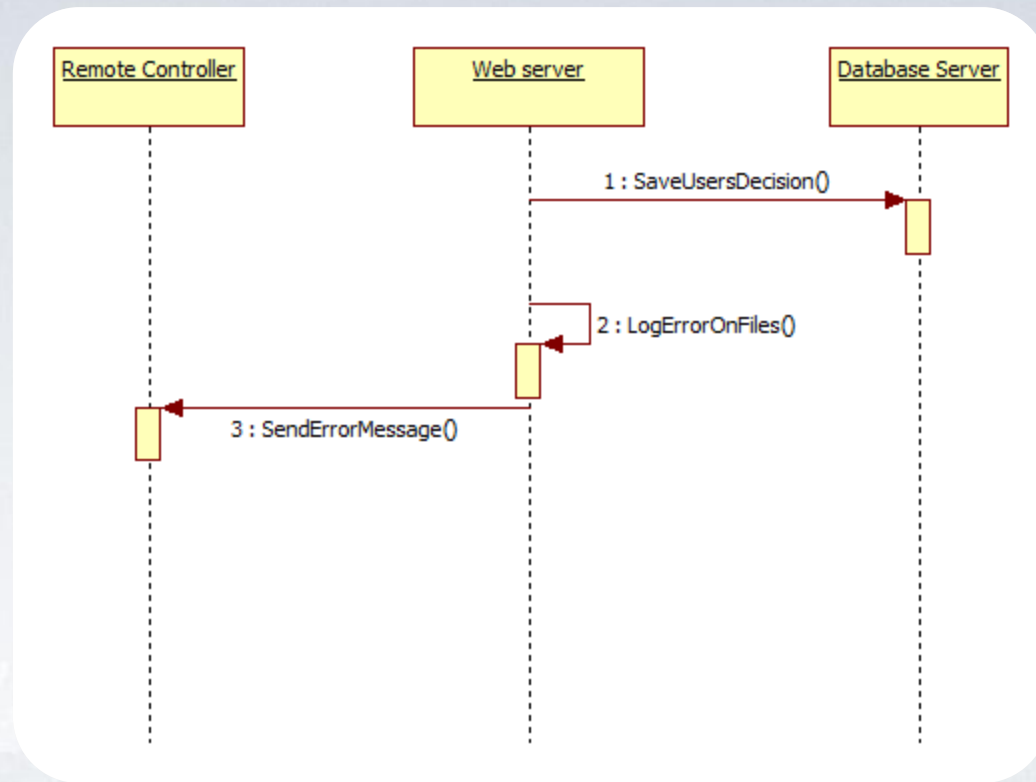
2135. Define System Sequence Diagrams

17. Stop music

2135. Define System Sequence Diagrams

18. Change volume

2135. Define System Sequence Diagrams

19. Save user's decision

2136. Define Operation Contract

Use Case	Name of Actor-Activated Event	System Operation
Register coffee machine	None	M_RegisterCoffeeMachine()
Register controller	1: Request register controller()	M_RegisterController()
Receive machine identification number	None	M_ReceiveMachineIdentificationNumber()
Save personal information	1: Request save personal information()	M_SavePersonalInformation()
Update personal information	1: Request update personal information()	M_UpdatePersonalInformation()
Reset saved records	1: Request reset saved records()	M_ResetSavedRecords()
Choose coffee to recommend	1: Request Choose coffee to recommend()	M_ChooseCoffeeToRecommend()
Request all menus with recommended coffee	None	M_RequestAllMenusWithRecommendedCoffee()
Select size of coffee	1: Request Select size of coffee()	M_SelectSizeOfCoffee()

2136. Define Operation Contract

Use Case	Name of Actor-Activated Event	System Operation
Select portion of water	1: Request Select portion of water()	M_SelectPortionOfWater()
Confirm ordered coffee	1: Request Confirm ordered coffee()	M_ConfirmOrderedCoffee()
Cancel ordered coffee	1: Request Cancel ordered coffee()	M_CancelOrderedCoffee()
Show remained materials	None	M_ShowRemainedMaterials()
Show recommended music	1: Request Show recommended music()	M_ShowRecommendedMusic()
Select music	1: Request Select music()	M_SelectMusic()
Play music	1: Request Play music()	M_PlayMusic()
Stop music	1: Request Stop music()	M_StopMusic()
Change volume	1: Change Change volume()	M_ChangeVolume()
Save user's decision	None	M_SaveUsersDecision()

2136. Define Operation Contract

Name	M_RegisterCoffeeMachine()
Responsibility	Register coffee machine to the web server to use it in the remote controller
Type	System
Cross References	System Function : R1.1.1
Notes	
Exceptions	An error occurs if networks are not available
Output	N/A
Pre-Conditions	N/A
Post-Conditions	The coffee machine is registered on the web and database server

2136. Define Operation Contract

Name	M_RegisterController()
Responsibility	Register the remote controller to the web server to authorize it
Type	System
Cross References	System Function : R1.1.2
Notes	
Exceptions	An error occurs if networks are not available
Output	N/A
Pre-Conditions	At least one coffee machine should be registered before
Post-Conditions	The remote controller is registered on the web and database server

2136. Define Operation Contract

Name	M_ReceiveMachineIdentificationNumber()
Responsibility	Receive the coffee machine's identification number to identify the coffee machine and make a relationship between the coffee machine and the remote controller
Type	System
Cross References	System Function : R1.1.3
Notes	
Exceptions	N/A
Output	Show received machine identification on the screen
Pre-Conditions	The machine is already registered on the web server
Post-Conditions	N/A

2136. Define Operation Contract

Name	M_SavePersonalInformation()
Responsibility	Save personal information to use it when the system determine what coffee to recommend or what music to recommend
Type	System
Cross References	System Function : R1.2.1
Notes	
Exceptions	N/A
Output	Show the result of the process
Pre-Conditions	The machine and remote controller is already registered on the web server
Post-Conditions	The personal information is saved on the web and database server

2136. Define Operation Contract

Name	M_UpdatePersonalInformation()
Responsibility	Update personal information to use it when the system determine what coffee to recommend or what music to recommend
Type	System
Cross References	System Function : R1.2.2
Notes	
Exceptions	N/A
Output	Show the result of the process
Pre-Conditions	The machine and remote controller is already registered on the web server
Post-Conditions	The personal information is updated on the web and database server

2136. Define Operation Contract

Name	M_ResetSavedRecords()
Responsibility	Delete all users' decisions on the database server
Type	System
Cross References	System Function : R1.2.3
Notes	
Exceptions	N/A
Output	Show the result of the process
Pre-Conditions	The machine and remote controller is already registered on the web server
Post-Conditions	N/A

2136. Define Operation Contract

Name	M_ChooseCoffeeToRecommend()
Responsibility	Choose coffee to recommend based on previous users' decisions to provide various coffee menus with recommended coffee
Type	System
Cross References	System Function : R1.3.1
Notes	
Exceptions	An error occurs if the database server is not accessible.
Output	N/A
Pre-Conditions	The machine and remote controller is already registered on the web server
Post-Conditions	N/A

2136. Define Operation Contract

Name	M_RequestAllMenusWithRecommendedCoffee()
Responsibility	Send a request message to gather all information about menus with recommended coffee
Type	System
Cross References	System Function : R1.3.2
Notes	
Exceptions	An error occurs if the database server is not accessible.
Output	N/A
Pre-Conditions	The machine and remote controller is already registered on the web server
Post-Conditions	Show all menus with recommended coffee on the remote controller

2136. Define Operation Contract

Name	M_SelectSizeOfCoffee()
Responsibility	Select size of coffee which means amount of coffee such as Grande, Tall and Short.
Type	System
Cross References	System Function : R1.3.3
Notes	
Exceptions	N/A
Output	Show the size the user selected.
Pre-Conditions	The user has been selected the coffee in "Show all menus with recommended coffee"
Post-Conditions	Move on to the "Select portion of water"

2136. Define Operation Contract

Name	M_SelectPortionOfWater()
Responsibility	Select portion of water to provide flavor coffee
Type	System
Cross References	System Function : R1.3.4
Notes	
Exceptions	N/A
Output	Show the portion the user selected
Pre-Conditions	The user has been selected the coffee and water in "Show all menus with recommended coffee" and "Select size of coffee"
Post-Conditions	Move on to the "Confirm order"

2136. Define Operation Contract

Name	M_ConfirmOrderedCoffee()
Responsibility	Confirm ordered option before starting to make a cup of coffee.
Type	System
Cross References	System Function : R1.4.1
Notes	
Exceptions	Warn the user if ingredients are insufficient
Output	Show the result and process about making coffee
Pre-Conditions	All options have been selected by the user
Post-Conditions	Make the system to enable "cancel ordered coffee" command Make coffee successfully

2136. Define Operation Contract

Name	M_CancelOrderedCoffee()
Responsibility	Cancelling ordered coffee can be available even if the coffee is currently making When cancel command has been executed, the system returns to the initial state.
Type	System
Cross References	System Function : R1.4.2
Notes	
Exceptions	An error occurs if the web server is not accessible.
Output	Show the result of the command which is a cancelling command.
Pre-Conditions	The coffee is currently making
Post-Conditions	Return to the initial state which is "Show all menus with recommended coffee" menu.

2136. Define Operation Contract

Name	M_ShowRemainedMaterials()
Responsibility	Remained materials should be observable
Type	System
Cross References	System Function : R1.5
Notes	
Exceptions	N/A
Output	Check remained materials and show it on the screen
Pre-Conditions	The machine and remote controller is already registered on the web server
Post_Conditions	If there is insufficient ingredient, show the alarm on the screen or let the user know by beep sound.

2136. Define Operation Contract

Name	M_ShowRecommendedMusic()
Responsibility	Retrieving recommended music from the web server
Type	System
Cross References	System Function : R1.6.1
Notes	
Exceptions	An error occurs if the web server is not accessible.
Output	Show recommended music on the remote controller
Pre-Conditions	The coffee should be ordered before
Post_conditions	Move on to the "Select music"

2136. Define Operation Contract

Name	M_SelectMusic()
Responsibility	The user can be able to select the music on the remote controller
Type	System
Cross References	System Function : R1.6.2
Notes	
Exceptions	An error occurs if the web server is not accessible.
Output	N/A
Pre-Conditions	A remote controller should be received music lists from the web server before
Post-Conditions	Move on to the "Play music"

2136. Define Operation Contract

Name	M_PlayMusic()
Responsibility	Play the music selected in "Select Music"
Type	System
Cross References	System Function : R1.6.3
Notes	
Exceptions	N/A
Output	The selected music is played on the coffee machine
Pre-Conditions	The music should be selected before
Post-Conditions	Show the result of the process

2136. Define Operation Contract

Name	M_StopMusic()
Responsibility	The music now playing should be stoppable when the user issued the stop command
Type	System
Cross References	System Function : R1.6.4
Notes	
Exceptions	N/A
Output	The music is stopped
Pre-Conditions	The music should be playing before
Post-Conditions	The system changes its mode to play it again

2136. Define Operation Contract

Name	M_ChangeVolume()
Responsibility	The volume can be adjustable
Type	System
Cross References	System Function : R1.6.5
Notes	
Exceptions	N/A
Output	The volume is changed
Pre-Conditions	A remote controller should be received music lists from the web server before
Post_conditions	The volume can be shown on the remote controller

2136. Define Operation Contract

Name	M_SaveUsersDecision()
Responsibility	Save users' decisions on the database server when some important decisions happened
Type	System
Cross References	System Function : R1.7
Notes	
Exceptions	An error occurs if the database is not accessible.
Output	N/A
Pre-Conditions	The machine and remote controller is already registered on the web server. Also, the database has been installed and successfully initialized by the administrator.
Post-Conditions	N/A