**URS-01: Administrator, farmer, and farm owner can request to log in to the system by inputting username and password.**

SRS-01: The system shall provide login page including text-field and login button to login using username and password.

SRS-02: The system shall allow user to access the application if the username and password match in the system.

SRS-03: The system shall not allow user to access the application if the user is a new farmer.

SRS-04: The system shall show the error message “Username or password is incorrect” if the user input incorrect username or password.

SRS-05: The system shall show the error message “Your accounthasnotbeenapprovedby administrator” if the user is a new farmer.

SRS-06: The system shall redirect to the main page after the user is logged on to the system.

SRS-07: The system shall show “•” instead of password in type of string on the screen.

**URS-02: Administrator, farmer, and farm owner can request to logout from the system.**

SRS-08: The system shall provide “Logout” button on the screen.

SRS-09: The system shall remove the session of the user.

SRS-10: The system shall redirect the user to the login page.

**URS-03: New farmer can request to register in the system by using famer’s personal information.**

SRS-11: The system shall provide registration page for the user including the input text-field for username, password, first name, last name, email, telephone number, and date of birth.

SRS-12: The system shall validate user personal information that the user has input.

SRS-13: The system shall show the error message “Incorrect format” if the user input the wrong format for registration.

SRS-14: The system shall show the error message “Please fill in all required fields” if the user doesn’t fill in all of the information needed.

SRS-15: The system shall provide confirmation pop-up including confirm button and cancel button to ask for confirmation of registration from the user.

SRS-16: The system shall add new account into the database if the user select confirm button.

SRS-17: The system shall display message “Register successful! Wait for administrator to approve”.

SRS-18: The system shall wait for the administrator to approve the farmer’s registration before the registration is successful.

**URS-04: Administrator can approve registration requests from new farmer by clicking “approve” button on the same row with the registration request that the administrator want to approve.**

SRS-19: The system shall provide the new farmer page including the list of new farmer request and “approve” button to the administrator.

SRS-20: The system shall validate the user id for approving the new farmer account that the administrator has chosen.

SRS-21: The system shall provide confirmation pop-up including confirm button and cancel button to ask for confirmation of approving the new farmer account from the administrator.

SRS-22: The system shall approve the new farmer account if the administrator selects confirm button.

SRS-23: The system shall display message “The new farmer account has been approving from the system”.

SRS-24: The system shall display the list of new farmer account that is in the database to the administrator.

**URS-05: Administrator can remove new farmer account in the system by using famer’s id.**

SRS-25: The system shall provide the new farmer page including the list of new farmer request and “remove” button to the administrator.

SRS-26: The system shall validate the user id for removing the new farmer account that the administrator has chosen.

SRS-27: The system shall provide confirmation pop-up including confirm button and cancel button to ask for confirmation of removing the new farmer account from the administrator.

SRS-28: The system shall remove the new farmer account if the administrator selects confirm button.

SRS-29: The system shall display message “The new farmer account has been removed from the system”.

SRS-30: The system shall display the list of new farmer account that is in the database to the administrator.

**URS-06: Administrator can view the list of new farmer account in the system, which will include username, name, last name, and telephone number.**

SRS-31: The system shall provide the new farmer page including “Submit” button and text-field to fill in username, name, last name, and telephone number.

SRS-32: The system shall retrieve the list of new farmer account from the database.

SRS-33: The system shall display the list of new farmer account in the system to the administrator.

**URS-07: Administrator can edit each Farmer’s personal information by inputting the new user’s personal information then click “Update” button.**

SRS-34: The system shall provide account management page including the text-field, and “Update” button for inputting first name, last name, age, date of birth, email, and telephone number and make confirmation.

SRS-35: The system shall only allow the user’s personal information that is uppercase A-Z, lowercase a-z, and 0-9.

SRS-36: The system shall display error message “Incorrect format” if the administrator input the wrong format of user’s personal information.

SRS-37: The system shall provide confirmation pop-up including confirm button and cancel button to ask for confirmation of updating the new user’s personal information from the administrator.

SRS-38: The system shall update the new user’s personal information into the database if the administrator selects confirm button.

SRS-39: The system shall display message “User’s personal information has been edited”.

SRS-40: The system shall display the list of farmer account that is in the system to the administrator.

**URS-08: Administrator can remove farmer account in the system by using famer’s id.**

SRS-41: The system shall provide the farmer page including the list of farmer request and “remove” button to the administrator.

SRS-42: The system shall validate the user id for removing the farmer account that the administrator has chosen.

SRS-43: The system shall provide confirmation pop-up including confirm button and cancel button to ask for confirmation of removing the farmer account from the administrator.

SRS-44: The system shall remove the farmer account if the administrator selects confirm button.

SRS-45: The system shall display message “The farmer account has been removed from the system”.

SRS-46: The system shall display the list of farmer account that is in the database to the administrator.

**URS-09: Administrator can view the list of farmer account in the system, which will include username, name, last name, and telephone number.**

SRS-47: The system shall provide the farmer page including the list of username, name, last name, and telephone number.

SRS-48: The system shall retrieve the list of farmer account from the database.

SRS-49: The system shall display the list of farmer account in the system to the administrator.

**URS-10: Administrator, Farmer, and Farm owner can change their password by inputting the current password and new password then click “Change password” button.**

SRS-50: The system shall provide the change password page including text-field and “change password” button for inputting the current password and new password then make confirmation.

SRS-51: The system shall only allow the user’s new password that is uppercase A-Z, lowercase a-z, and 0-9.

SRS-52: The system shall display error message “Incorrect password” if the user input the wrong current password.

SRS-53: The system shall display error message “New password doesn’t match” if the user input the new password and confirm new password that is not the same as each other.

SRS-54: The system shall provide confirmation pop-up including “Confirm” button and “Cancel” button to ask for confirmation for changing new password from the user.

SRS-55: The system shall update the new password into the database if the user selects “Confirm” button.

SRS-56: The system shall display message “Change password successful” to the user.

**URS-11: Farmer and Farm owner can view the list of each device monitor that is working, which will include device name, temperature, humidity, soil moisture, and latest update at current time.**

SRS-57: The system shall provide the environmental monitoring page, which will include the list of each device name, temperature, humidity, soil moisture, and date for the user.

SRS-58: The system shall retrieve the environmental data from the sensor and record it into the database in every 2 seconds.

SRS-59: The system shall retrieve the environmental data of current time from the database.

SRS-60: The system shall display error message “No data” if there is no data in the database.

SRS-61: The system shall display the environmental data of current time to the user.

**URS-12: Farmer and Farm owner can view the list of statistics monitor, which will include lowest temperature, highest temperature, average temperature, lowest humidity, highest humidity, average humidity, lowest soil moisture, highest soil moisture, average soil moisture, and latest update at current hour.**

SRS-62: The system shall provide the environmental monitoring page, which will include the list of lowest temperature, highest temperature, average temperature, lowest humidity, highest humidity, average humidity, lowest soil moisture, highest soil moisture, average soil moisture, and latest update.

SRS-63: The system shall retrieve the environmental data of current hour from the database.

SRS-64: The system shall display error message “No data” if there is no data in the database.

SRS-65: The system shall retrieve the environmental current time data from the database and calculate the lowest, highest, and average of environmental data within the system and record it into the database in every hour.

SRS-66: The system shall display the environmental data of current hour to the user.

**URS-13: Farmer and Farm owner can view the history of statistics that is measured as a list, which will include lowest temperature, highest temperature, average temperature, lowest humidity, highest humidity, average humidity, lowest soil moisture, highest soil moisture, average soil moisture, and date.**

SRS-67: The system shall provide the environmental monitoring page, which will include the list of lowest temperature, highest temperature, average temperature, lowest humidity, highest humidity, average humidity, lowest soil moisture, highest soil moisture, average soil moisture, “select date” button, and “time” drop-drown menu.

SRS-68: The system shall validate the date and time of the statistics that the user has input

SRS-69: The system shall retrieve the environmental data of current hour from the database.

SRS-70: The system shall display error message “No data” if there is no data in the database.

SRS-71: The system shall display error message “Please select the statistic date” if the user hasn’t select the date and time.

SRS-72: The system shall calculate the lowest, highest, and average of every environmental data within the system.

SRS-73: The system shall display the environmental statistics data within a day to the user if the user selects only date and not time.

SRS-74: The system shall display the environmental statistics data within selected hour of a day to the user if the user selects date and time.

**URS-14: Farm owner can add new device into the system by inputting name and click “ADD” button.**

SRS-75: The system shall provide the device control page including text field and “ADD” button for inputting the name of the new device.

SRS-76: The system shall validate the name of the new device for adding device that the user has input.

SRS-77: The system shall display error message “The name of the device is taken” if the device name already existed.

SRS-78: The system shall display error message “incorrect format” if the user input the wrong format.

SRS-79: The system shall only allow device name that are uppercase A-Z, lowercase a-z, and 0-9.

SRS-80: The system shall provide confirmation pop-up including confirm button and cancel button to ask for confirmation of adding the device from the user.

SRS-81: The system shall add the new device into the database if the user select confirm button.

SRS-82: The system shall display the list of new device that is added to the database to the user.

SRS-83: The system shall display message “New device has been added to the system”.

**URS-15: Farm owner can edit the name of the device by inputting new name and click “Update” button on the same row with the device that the user wants to edit.**

SRS-84: The system shall provide the device control page including text field and “Update” button for editing the name of the device.

SRS-85: The system shall validate the new name of the device for updating device that the user has input.

SRS-86: The system shall display error message “The name of the device is taken” if the device name already existed.

SRS-87: The system shall display error message “incorrect format” if the user input the wrong format.

SRS-88: The system shall only allow device name that are uppercase A-Z, lowercase a-z, and 0-9.

SRS-89: The system shall provide confirmation pop-up including confirm button and cancel button to ask for confirmation of updating the device from the user.

SRS-90: The system shall update the edited name of the device into the database if the user select confirm button.

SRS-91: The system shall display the device name that is edited to the user.

SRS-92: The system shall display message “Device has been updated”.

**URS-16: Farm owner can remove the device from the system by clicking “Delete” button on the same row with the device that the user wants to remove.**

SRS-93: The system shall provide the device control page including “Delete” button for removing the device from the system.

SRS-94: The system shall validate the device id for removing device that the user has chosen.

SRS-95: The system shall provide confirmation pop-up including confirm button and cancel button to ask for confirmation of removing the device from the user.

SRS-96: The system shall remove the device out of the database if the user select confirm button.

SRS-97: The system shall display the list of device that is in the database to the user.

SRS-98: The system shall display message “Device has been removed”.

**URS-17: Farm owner can view the list of every device in the system, which will include device id, device name.**

SRS-99: The system shall provide the device control page including table for the list of every device in the system.

SRS-100: The system shall retrieve the list of device from the database.

SRS-101: The system shall display the list of device in the system to the user.

**URS-18: Farm owner can set the moisture level in the soil to water the plants and stop giving water to the plants when the average soil moisture in current hour is lower or higher than the user’s setting by inputting the value of soil moisture to the system.**

SRS-102: The system shall provide the device control page including text field and button for inputting the value of soil moisture that the user wants the system to give water and stop giving water to the plants.

SRS-103: The system shall validate the soil moisture value for device settings that the user has input.

SRS-104: The system shall display error message “Setting is incomplete” if the user haven’t fill all information in the text field given.

SRS-105: The system shall display error message “incorrect format” if the user input the wrong format.

SRS-106: The system shall only allow average soil moisture that is only 0-9.

SRS-107: The system shall provide confirmation pop-up including confirm button and cancel button to ask for confirmation of settings in the device from the user.

SRS-108: The system shall record the settings from the user into the database if the user select confirm button.

SRS-109: The system shall send message on/off to the board when the average soil moisture in current hour value meets the settings that the user has input to the system.

**URS-19: Farm owner can predict the product yield by selecting the product name that is already in the system and inputting the number of time to make prediction then click “View” button.**

SRS-110: The system shall provide the prediction page, which will include the list of product name and a drop-down menu for selecting the product and inputting the number of time to make prediction.

SRS-111: The system shall only allow number of time that is only 0-9.

SRS-112: The system shall display error message “incorrect format” if the user input the wrong number of time format.

SRS-113: The system shall retrieve the production stock data from the database.

SRS-114: The system shall calculate the production stock data to find out the prediction of the selected product by using ARIMA Model in the R-serve (Ŷt  =  μ  + Yt-1  +  ϕ1 (Yt-1- Yt-2) ).

SRS-115: The system shall display error message “Not enough information to calculate for prediction, In order to make prediction the system needs at least 6 months of the production stock data.” if the production stock data of that product doesn’t last at least 6 months.

SRS-116: The system shall display the outcome of the prediction to the user.

**URS-20: Farm owner can create product in the system by inputting name and unit and click “ADD” button.**

SRS-117: The system shall provide the product page including text field and “ADD” button for inputting the name and unit of product made within the farm and make confirmation.

SRS-118: The system shall validate the new product name and unit for adding product that the user has input.

SRS-119: The system shall display error message “incorrect format” if the user input the wrong format.

SRS-120: The system shall display error message “This product is already in the system” if the user input the product name that already exist in the system.

SRS-121: The system shall only allow product name that are uppercase A-Z, lowercase a-z.

SRS-122: The system shall only allow unit that is uppercase A-Z, lowercase a-z.

SRS-123: The system shall provide confirmation pop-up including confirm button and cancel button to ask for confirmation of adding the product from the user.

SRS-124: The system shall add new product name and unit into the database if the user selects confirm button.

SRS-125: The system shall display message “Product has been added to the system”

SRS-126: The system shall display the list of product name and unit that is in the system to the user.

**URS-21: Farm owner can edit product in the system by inputting name and unit and click “Update” button.**

SRS-127: The system shall provide the product page including text field and “Update” button for inputting the name and unit of product made within the farm and make confirmation.

SRS-128: The system shall validate the new product name and unit for updating product that the user has input.

SRS-129: The system shall display error message “incorrect format” if the user input the wrong format.

SRS-130: The system shall display error message “This product is already in the system” if the user input the product name that already exist in the system.

SRS-131: The system shall only allow product name that are uppercase A-Z, lowercase a-z.

SRS-132: The system shall provide confirmation pop-up including confirm button and cancel button to ask for confirmation of updating the product from the user.

SRS-133: The system shall update edited product into the database if the user select confirm button.

SRS-134: The system shall display message “Product has been edited”

SRS-135: The system shall display the product that is in the system to the user.

**URS-22: Farm owner can remove the product from the system by clicking “Delete” button on the same row with the product that the user wants to remove.**

SRS-136: The system shall provide the product page including “Delete” button for removing the product from the system.

SRS-137: The system shall validate the product id for removing product that the user has chosen.

SRS-138: The system shall provide confirmation pop-up including confirm button and cancel button to ask for confirmation of removing the product from the user.

SRS-139: The system shall remove the product name and unit from the database if the user select confirm button.

SRS-140: The system shall display message “Product has been removed from the system”

SRS-141: The system shall display the list of product that is in the database to the user.

**URS-23: Farm owner can view the list of product in the system, which will include product name, product unit.**

SRS-142: The system shall provide the product page including the list of product name and unit of all products in the system.

SRS-143: The system shall retrieve the list of product from the database.

SRS-144: The system shall display the list of product in the system to the user.

**URS-24: Farmer can make a record of production yield by selecting the product that is already in the system and inputting the quantity then click “Add” button to complete the production record.**

SRS-145: The system shall provide the product stock page including text field, drop-down menu, and “ADD” button for selecting the product and inputting the quantity of product.

SRS-146: The system shall validate the production record for adding production record that the user has input.

SRS-147: The system shall display error message “incorrect format” if the user input the wrong format.

SRS-148: The system shall only allow quantity that is 0-9.

SRS-149: The system shall provide confirmation pop-up including confirm button and cancel button to ask for confirmation of adding the production record from the user.

SRS-150: The system shall retrieve the water on and water off value in device setting from database to record with the production record if the user select confirm button.

SRS-151: The system shall retrieve user account that’s making a record from database to record with the production record.

SRS-152: The system shall add the production record into the database.

SRS-153: The system shall display message “Production record has been added into the system”.

SRS-154: The system shall display the production record that is in the system to the user.

**URS-25: Farmer can edit the production record in the system by selecting the product that is already in the system and inputting the quantity then click “Update” button.**

SRS-155: The system shall provide the product stock page including text field, drop-down menu, and “Update” button for inputting the quantity of the product and make confirmation.

SRS-156: The system shall validate the production record for updating production record that the user has input.

SRS-157: The system shall display error message “incorrect format” if the user input the wrong format.

SRS-158: The system shall only allow quantity that is 0-9.

SRS-159: The system shall provide confirmation pop-up including confirm button and cancel button to ask for confirmation of updating the production record from the user.

SRS-160: The system shall update the production record into the database if the user select confirm button.

SRS-161: The system shall display message “Production record has been edited”.

SRS-162: The system shall display the production record that is in the system to the user.

**URS-26: Farmer can remove the production record from the system by clicking “Delete” button on the same row with the production record that the user wants to remove.**

SRS-163: The system shall provide the product stock page including “Delete” button for removing the production record from the system.

SRS-164: The system shall validate the production record id for removing production record that the user has chosen.

SRS-165: The system shall provide confirmation pop-up including confirm button and cancel button to ask for confirmation of removing the production record from the user.

SRS-166: The system shall remove the production record from the database if the user select confirm button.

SRS-167: The system shall display message “Production record has been removed from the system”.

SRS-168: The system shall display the list of production record that is in the database to the user.

**URS-27: Farmer and Farm owner can view the list of production record in the system, which will include product name, and quantity.**

SRS-169: The system shall provide the product stock page including drop-down menu, and table for the list of production record in the system.

SRS-170: The system shall retrieve the list of production record from the database.

SRS-171: The system shall display the list of production record in the system to the user.

**URS-28: Farm owner can do a simulation for the product yield by selecting the product name that already exists in the system then selecting the level of soil moisture for turning water on and off automatically to make simulation then click “View” button.**

SRS-172: The system shall provide the simulation, which will include the list of product name and a drop-down menu for selecting the product and selecting the level of soil moisture for turning water on and off automatically to make simulation.

SRS-173: The system shall retrieve the production stock data from the database.

SRS-174: The system shall display error message “Not enough information to calculate for simulation, In order to make a simulation the system needs at least 6 months of the production stock data”. If the production stock data of that product doesn’t last at least 6 months.

SRS-175: The system shall calculate the production stock data to find out the product yield by using Markov Chains in the R-server P(Xn+1 = j || k Xn = i,Xn−1 = kn−1,...) = p(i, j ).

SRS-176: The system shall display the outcome of the simulation to the user.

**URS-29: Farmer can fill in disease in the disease record by selecting the product (plant) that is already in the system and inputting the disease name then click “Add” button to complete the disease record.**

SRS-177: The system shall provide the disease record page including text field, drop-down menu, and “ADD” button for selecting the product (plant) and inputting the disease name.

SRS-178: The system shall only allow disease name that is uppercase A-Z, lowercase a-z, and 0-9.

SRS-179: The system shall display error message “incorrect format” if the user input the wrong disease name format.

SRS-180: The system shall provide confirmation pop-up including confirm button and cancel button to ask for confirmation of adding the disease record from the user.

SRS-181: The system shall retrieve user account that’s making a record from database to record with the disease record if the user select confirm button.

SRS-182: The system shall add the disease into the database.

SRS-183: The system shall display message “Disease has been added into the system”.

SRS-184: The system shall display the disease record that is in the system to the user.

**URS-30: Farmer can edit the disease record in the system by selecting the product (plant) that is already in the system and inputting the disease name then click “Update” button.**

SRS-185: The system shall provide the disease record page including text field, drop-down menu, and “Update” button for inputting the disease name of the product (plant) and make confirmation.

SRS-186: The system shall display error message “incorrect format” if the user input the wrong disease name format.

SRS-187: The system shall only allow disease name that is uppercase A-Z, lowercase a-z, and 0-9.

SRS-188: The system shall provide confirmation pop-up including confirm button and cancel button to ask for confirmation of updating the disease record from the user.

SRS-189: The system shall update the disease record into the database if the user select confirm button.

SRS-190: The system shall display message “Disease record has been edited”.

SRS-191: The system shall display the disease record that is in the system to the user.

**URS-31: Farmer can remove the disease record from the system by clicking “Delete” button on the same row with the disease record that the user wants to remove.**

SRS-192: The system shall provide the disease record page including “Delete” button for removing the disease record from the system.

SRS-193: The system shall validate the disease record id for removing disease record that the user has chosen.

SRS-194: The system shall provide confirmation pop-up including confirm button and cancel button to ask for confirmation of removing the disease record from the user.

SRS-195: The system shall remove the disease record from the database if the user select confirm button.

SRS-196: The system shall display message “Disease record has been removed from the system”.

SRS-197: The system shall display the list of disease record that is in the database to the user.

**URS-32: Farmer and Farm owner can view the list of disease record in the system, which will include product name (plant), and disease name.**

SRS-198: The system shall provide the disease record page including drop-down menu, and table for the list of disease record in the system.

SRS-199: The system shall retrieve the list of disease record from the database.

SRS-200: The system shall display the list of disease record in the system to the user.