| Project name | **Smart Garden for everyone** |
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| 1. Short project description (Business needs and system features) |
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| Smart Garden project monitors plants and the conditions at which the plants are grown, their state and progress. The tool is applicable for small family gardens as well as for big farms.  Users can monitor the data from different sensors (soil moisture, humidity, temperature, light levels) in the form of graphs and tables in real time. Users also can add notes ( comments / reviews) to mark the current state of the plants.  Based on analysed data the *Gardener* can edit the functionality and behaviour of the automated system (watering system, light and air conditioner system for greenhouses).  The measurements from sensors are uploaded in real time and used for controlling the watering system, light and air conditioner systems.  The main user roles (actors in UML) are:  • *Farmhand* (extends *User*) – can monitor plants' state and write notes in real time.  • *Gardener* (extends *User*) – Can monitor sensor data. Manages gardens (create, delete, edit *Gardens*). Modifies system behaviour based on data analysis.  • *Administrator* (extends *User*) – can manage (create, edit users info and permissions) other users. |

| 1. Main Use Cases / Scenarios | | |
| --- | --- | --- |
| **Use case name** | **Brief Descriptions** | **Actors Involved** |
| * 1. **Browse Users** | *Administrators* can browse users. | *Administrator* |
| * 1. **Register new user** | *Administrators* can register new users by entering *User Data* and choosing a Role (*Farmhand, Gardener*, or *Administrator*). | *Administrator* |
| * 1. **Change User Data** | *All Users* can view and edit their personal *User Data*.  *Administrator* can view and edit *User Data* of all *Users* and assign them *Roles*: *Farmhand, Gardener*, or *Administrator*. | *User, Administrator* |
| * 1. **Manage Users** | *Administrators* can browse and filter users based on different criteria: first and last name, email, Role.  *Administrator* can choose a *User* to manage, and can manage the chosen User - edit (using Change User Data UC) or delete.  *Administrators* can create a new user using *Register UC*. | *Administrator* |
| * 1. **Manage Gardens** | *Gardeners* can browse gardens. Can add, delete gardens and edit their specifications. | *Gardener, Administrator* |
| * 1. **Add / Delete / Edit Gardens** | *Gardener* or *Administrator* edits *Garden specifications / needs (how much watering, humidity, light, temperature are needed)* | *Gardener, Administrator* |
| * 1. **Fill quality check** | *Farmhand, Gardener, Administrator* can add notes on the go. Notes / Reviews are used to describe plants’ health / status. | *Farmhand, Gardener, Administrator* |
| * 1. **Browse Notes** | *Farmhand*  can browse their own *Notes*.  *Gardeners, Administrator* can browse all *Notes*. | *Farmhand, Gardener, Administrator* |
| * 1. **Manage Sensors** | *Gardener, Administrator* can browse, edit, add, remove sensors. | *Gardener, Administrator* |
| **2.10. Browse sensor data** | The *User* can browse the information from sensors, displayed for different time periods in the form of graphs and tables. | All users |

| 1. Main Views | |
| --- | --- |
| **View name** | **Brief Descriptions** |
| * 1. **Home** | Welcome page, Login panel, list with available activities. |
| * 1. **Gardens** | List with all available gardens. Offers ability to view garden details. Depending on the user role, a new *Garden* can be added. |
| * 1. **Garden Details** | Shows *Garden* properties, plants in the garden and sensor data. Offers ability to edit Garden properties depending on user rights. Offers ability to add notes. |
| * 1. **Plants** | Lists plants in the garden and their needs. Offers ability to add notes. |
| * 1. **Sensors** | Lists sensors in the *Garden*. |
| * 1. **Sensor data** | Shows the data from the sensor. Shows sensor properties. |
| * 1. **Users** | Presents ability to manage (CRUD) *Users* and their *User Data* (available for *Administrators* only, as described in UCs). |
| * 1. **User Data** | Presents ability to view and edit personal *User Data*. |

| 1. Main Classes | |
| --- | --- |
| **Class name** | **Brief Descriptions** |
| * 1. **User** | Base class describing users attributes and properties. |
| * 1. **Garden** | Small pieces of ground. Each garden has one type of plant and composition of sensors. |
| * 1. **Plant** | Each plant needs a different level of humidity, soil moisture, temperature and amount of light. |
| * 1. **Sensor** | Base class describing a sensor. |
| * 1. **Measurement** | Base class describing measurements from different types of sensors. |
| * 1. **Note** | Short reviews of *Garden’s/ Plant’s* state or progress |

| ***User*** | |
| --- | --- |
| id | long number (automatically generated) |
| first\_name | string |
| last\_name | string |
| email | valid email address |
| password | string (between 8-15 symbols; A mixture of uppercase and lowercase; A mixture of letters and numbers; Inclusion of at least one special character, e.g., ! @ # ? ] ) |
| role | (Farmhand, Gardener, Administrator) |
| status | (active; change\_password; deactivated) |
| date\_created | timestamp (automatically generated at creation time) |
| date\_modified | timestamp (automatically generated at modified time ) |

| ***Garden*** | |
| --- | --- |
| id | long number (automatically generated) |
| name | string |
| type | string |
| dimensions | tuple of floats (width, height) |
| location |  |
| status | active / watering |
| date\_created | timestamp (automatically generated at creation time) |
| pots | list of pots |
| sensors | list of sensors |

| ***Pots*** | |
| --- | --- |
| id | long number (automatically generated) |
| name | string |
| type / description | (herbs, tomatoes..) |
| humidity | tuple of ints (min, max) - minimum and maximum acceptable values - in percentages |
| soil moisture | tuple of ints (min, max) - minimum and maximum acceptable values |
| temperature | tuple of floats (min, max) - minimum and maximum acceptable values |
| light\_levels | tuple of ints (min, max) - minimum and maximum acceptable values |

| ***Sensor*** | |
| --- | --- |
| id | long number (automatically generated) |
| name | string |
| type | string |
| data | Measurement |
| time\_intervals | *time intervals at which a measurement is taken ?* |

| ***Measurement*** | |
| --- | --- |
| id | long number (automatically generated) |
| type | string |
| date\_time | date\_time type |
| data | actual measurements |

| ***Quality Report*** | |
| --- | --- |
| id | long number (automatically generated) |
| date\_time\_created | date\_time type |
| author | user |
| plant\_heigh | int |
| plant\_colorization |  |