



Università degli Studi di Salerno



Dipartimento di Ingegneria dell'Informazione ed Elettrica e
Matematica Applicata

Corso di Laurea Magistrale in Ingegneria Informatica

Software Architecture Design 2024/2025

Canale I-Z

Project Work

Gruppo n. 02 – IZ

| Cognome e Nome | Matricola | e-mail |
|---------------------------|------------------|-------------------------------|
| Iannone Davide | 0622702572 | d.iannone19@studenti.unisa.it |
| Lomazzo Noemi | 0622702663 | n.lomazzo@studenti.unisa.it |
| Sirica Simone | 0622702627 | s.sirica5@studenti.unisa.it |
| Petrone Gianluca | 0622702642 | g.petrone27@studenti.unisa.it |

Anno accademico 2024-2025

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1. Pre-game

1.1. User stories, Acceptance Criteria & Tasks

US1

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|--|---|----------|--------------|--|-----------|
| As a user I want an empty window to be displayed when I start the application So that I can make new drawings | Given the installed application When I start the application Then an empty window is displayed | MUST | 1 | <ul style="list-style-type: none"> Create an empty page of the program Create a space for the tool bar | 1 |

US2

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|--|---|----------|--------------|---|-----------|
| As a user I want to be able to use the mouse on the window and choose the geometrical shape to add to my drawing So that I can position the geometrical form in the chosen position | Given a drawing screen When I click on the window Then the shape is drawn at the selected position | MUST | 1 | <ul style="list-style-type: none"> Create an event handler for the mouse | 1 |

US3

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|---|--|----------|--------------|--|-----------|
| As a user I want to add line segments So that I can place line segments into my drawings | Given a list of shapes When I click 'Line segment' AND I click two points in the window | MUST | 1 | <ul style="list-style-type: none"> Create a segment line button in the toolbar Implement the logic for segment line creation Implementation and | 1 |

| | | | | | |
|--|---|--|--|--------------------|--|
| | Then a line segment, linking the points, is added to the drawing | | | execution of tests | |
|--|---|--|--|--------------------|--|

US4

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|---|---|----------|--------------|---|-----------|
| As a user I want to add rectangles So that I can place rectangles into my drawings | Given a list of shapes When I click 'Rectangle' Then a rectangle is added to the drawing with a defined width and height | MUST | 1 | <ul style="list-style-type: none"> • Create rectangle shape button in the toolbar • Implement the logic for rectangle creation • Implementation and execution of tests | 1 |

US5

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|---|--|----------|--------------|---|-----------|
| As a user I want to add ellipses So that I can place ellipses into my drawings | Given a list of shapes When I click 'Ellipse' Then an ellipse is added to the drawing with a defined width and height | MUST | 1 | <ul style="list-style-type: none"> • Create ellipse shape button in the toolbar • Implement the logic for ellipse creation • Implementation and execution of tests | 1 |

US6

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|---|---|----------|--------------|--|-----------|
| <p>As a user I want to choose the color of the geometrical shape So that I can color the border of the added shape</p> | <p>Given a selected shape When I open the color palette with exactly 8 predefined color options AND I choose one of this color Then the selected shape changes its border color</p> | MUST | 2 | <ul style="list-style-type: none"> • Create a color icon for the color of the border of a shape • Add eight different colors in the color menu • Implement the logic that after selecting the color and placing a shape, the border of the shape is coloured by the selected one • Implementation and execution of tests | 1 |

US7

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|--|---|----------|--------------|---|-----------|
| <p>As a user I want to choose the color of a closed shape So that I can color the interior of the shape</p> | <p>Given a selected closed shape When I open the color palette with exactly 8 predefined color options AND I choose</p> | MUST | 2 | <ul style="list-style-type: none"> • Create a button for internal color • Add eight different color in the color menu • Implement the logic that after selecting the color and placing a closed shape, the interior of the shape is coloured by the selected one | 1 |

| | | | | | |
|--|---|--|--|---|--|
| | one of this color Then the interior selected closed shape color changes | | | <ul style="list-style-type: none"> Implementation and execution of tests | |
|--|---|--|--|---|--|

US8

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|---|--|----------|--------------|--|-----------|
| As a user I want to save the drawing on a file So that I don't lose the draw | Given a drawing When I click 'Save' Then the drawing is saved to a file | MUST | 2 | <ul style="list-style-type: none"> Create the "Save" button in the toolbar Implement save logic for the save button Implementation and execution of tests | 1 |

US9

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|---|---|----------|--------------|--|-----------|
| As a user I want to load a drawing previously saved on a file So that I can continue modifying the drawing whenever I want | Given a drawing screen When I click 'Load' AND I select a file Then the selected drawing appears on the screen | MUST | 2 | <ul style="list-style-type: none"> Create the "Load" button in the toolbar Implement load logic for the load button Implementation and execution of tests | 1 |

US10

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|--|------------------------------------|----------|--------------|--|-----------|
| As a user I want to be able to select one shape | Given a drawing with shapes | MUST | 1 | <ul style="list-style-type: none"> Implement the logic to manage the click on a shape | 1 |

| | | | | | |
|--|---|--|--|---|--|
| with the mouse So that I can perform any operation on the selected shape | When I click shape Then it becomes highlighted | | | <ul style="list-style-type: none"> Implementation and execution of tests | |
|--|---|--|--|---|--|

US11

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|--|---|----------|--------------|---|-----------|
| As a user I want to delete a selected shape So that I can remove the shape from the drawing | Given a selected shape When I click 'Delete' Then the shape is removed | SHOULD | 2 | <ul style="list-style-type: none"> Create a menu for right click on the window Create "Delete" button in the right click menu Implement the logic to delete the shape Implementation and execution of tests | 1 |

US12

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|---|--|----------|--------------|---|-----------|
| As a user I want to move a selected shape in a different position So that I can modify the position of a shape | Given a selected shape When I drag it to a new position Then the shape is moved into the new location | SHOULD | 2 | <ul style="list-style-type: none"> Add handler for mouse drag functions Implementation and execution of tests | 1 |

US13

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|--|-------------------------------|----------|--------------|---|-----------|
| As a user I want to change the color of a | Given a selected shape | SHOULD | 2 | <ul style="list-style-type: none"> Implement the logic for changing the color of a | 1 |

| | | | | | |
|--|---|--|--|---|--|
| selected shape So that I can choose an appropriate color for the drawing | When I choose a new color from the palette Then the shape color is updated | | | placed shape <ul style="list-style-type: none"> Implementation and execution of tests | |
|--|---|--|--|---|--|

US14

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|---|---|----------|--------------|---|-----------|
| As a user I want to change the size of a selected shape So that I can resize the shape | Given a selected shape When I click on a placed shape AND modify its dimensions in the specific boxes Then size shape is updated | SHOULD | 3 | <ul style="list-style-type: none"> Create size field in the right click menu Implement the logic to manage the resize of a shape Implementation and execution of tests | 1 |

US15

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|---|--|----------|--------------|---|-----------|
| As a user I want to use a cut operation on a shape So that I can remove and possibly paste the shape | Given a selected shape When I click 'Cut' Then the selected shape is removed and copied to the clipboard AND possibly paste it in a | SHOULD | 2 | <ul style="list-style-type: none"> Create the "Cut" button in the right click menu Implement the logic linked to the cut button to cut a shape Implementation and execution of tests | 1 |

| | | | | | |
|--|-----------------|--|--|--|--|
| | different place | | | | |
|--|-----------------|--|--|--|--|

US16

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|---|--|----------|--------------|--|-----------|
| As a user I want to use a copy operation on a shape So that I can copy an already placed shape | Given a selected shape When I click 'Copy' Then the selected shape is copied to the clipboard AND possibly paste it in a different position | SHOULD | 2 | <ul style="list-style-type: none"> • Create the "Copy" button in the right click menu • Implement the logic linked to the copy button to copy a shape • Implementation and execution of tests | 1 |

US17

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|---|--|----------|--------------|---|-----------|
| As a user I want to use a paste operation So that I can place again a copied shape | Given a drawing screen When I click 'Paste' Then the shape on the clipboard is added to the drawing | SHOULD | 2 | <ul style="list-style-type: none"> • Create the "Paste" button in the right click menu • Implement the logic linked to the paste button to paste a shape • Implementation and execution of tests | 1 |

US18

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|--|--|----------|--------------|---|-----------|
| As a user I want that my operations are | Given an action has occurred When I click | SHOULD | 3 | <ul style="list-style-type: none"> • Create the "undo" button in the interface | 1 |

| | | | | | |
|---|---|--|--|---|--|
| defeasible So that I can undo my operations | the undo arrows Then I can undo the last operation AND previous state is restored | | | <ul style="list-style-type: none"> Implement the logic of the button, that delete the last operation done Implementation and execution of tests | |
|---|---|--|--|---|--|

US19

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|---|--|----------|--------------|---|-----------|
| As a user I want to send a shape to the front So that I can order the overlapping shapes | Given the overlapping shapes When I click 'To the front' Then the selected shape moves to the front | SHOULD | 3 | <ul style="list-style-type: none"> Create the "to the front" option when a shape is selected Implement the logic that places the selected shape to the front Implementation and execution of tests | 2 |

US20

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|--|--|----------|--------------|---|-----------|
| As a user I want to send a shape to the back So that I can order the overlapping shapes | Given overlapping shapes When I click 'To the back' Then the selected shape moves to the back | SHOULD | 3 | <ul style="list-style-type: none"> Create the "to the back" option when a shape is selected Implement the logic that places the selected shape to the back Implementation and execution of tests | 2 |

US21

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|---|---|----------|--------------|--|-----------|
| As a user I want to zoom the interface So that I can see better my drawing | Given a drawing When I click on the lens icon AND I can zoom up to 4 levels in or out Then the view zooms in or out accordingly | COULD | 3 | <ul style="list-style-type: none"> • Create the “zoom in” and “zoom out” buttons in the interface • Implement “zoom in” button that, for every click, zoom in the interface • Implement the “zoom out” button that, for every click zooms out on the interface • Implementation and execution of tests | 2 |

US22

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|--|--|----------|--------------|--|-----------|
| As a user I want to use the scroll bar So that I can see the other parts of the drawing | Given a drawing screen larger than window When I click and drag the scroll bar Then the other parts of the drawing become visible | COULD | 2 | <ul style="list-style-type: none"> • Create a horizontal scrollbar at the bottom of the window • Create a vertical scrollbar at the right of the window • Implementation and execution of tests | 2 |

US23

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|--|---|----------|--------------|---|-----------|
| As a user I want to activate and deactivate the grid So that I can place the shapes more easily | Given a drawing screen When I click on the grid icon Then the grid appears if deactivated or disappears if activated | COULD | 3 | <ul style="list-style-type: none"> • Create a “toggle grid” button in the toolbar • Implement the logic of the button that shows or hides a grid • Implementation and execution of tests | 2 |

US24

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|---|---|----------|--------------|---|-----------|
| As a user I want to choose the grid size So that I can draw more precisely | Given an active grid When I select a new grid size Then the grid spacing updates accordingly | COULD | 3 | <ul style="list-style-type: none"> • Create a “grid size” option in the toolbar • Implement the logic that change the size of the grid • Implementation and execution of tests | 2 |

US25

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|---|--|----------|--------------|--|-----------|
| As a user I want to enter an arbitrary polygon So that I can make more complex drawing | Given a drawing screen When I click ‘Polygon’ AND I click on different points on the drawing Then these will be connected | COULD | 5 | <ul style="list-style-type: none"> • Create a “Polygon” option in the toolbar • Create the logic that connects the selected points creating a closed shape • Implementation | 2 |

| | | | | | |
|--|--|--|--|------------------------|--|
| | by lines that will be visible on the drawing sheet | | | and execution of tests | |
|--|--|--|--|------------------------|--|

US26

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|--|---|----------|--------------|---|-----------|
| As a user I want to add a text string as a shape So that I can include titles or notes where needed | Given a drawing screen When I select the text string shape AND I write it AND I choose the size Then it will be added as a shape | COULD | 3 | <ul style="list-style-type: none"> • Create a “text” option in the toolbar • Create a field to write a text string • Create a field to choose the size of a text string • Implement the logic that places a text in the chosen point • Implementation and execution of tests | 2 |

US27

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|--|---|----------|--------------|--|------------------------------|
| As a user I want to rotate a shape by an arbitrary angle So that I can change the shape direction | Given a selected shape When I click ‘Rotation’ AND I set a rotation angle Then the shape rotates accordingly | COULD | 8 | <ul style="list-style-type: none"> • Create a “Rotate” option in the right click menu of a shape • Create a field in the “Rotate” option where an angle can be specified • Implement the logic that rotates the selected shape at the chosen angle • Implementation and execution of tests | 2 partially + 3 partially |

US28

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|--|---|----------|--------------|---|-----------|
| <p>As a user I want to mirror a shape horizontally or vertically So that I can mirror the shape more easily</p> | <p>Given a selected shape When I click 'Mirror horizontal' Then the shape mirrors with a vertical axis of symmetry.</p> <p>Given a selected shape When click "Mirror vertical" Then the shape mirrors with a horizontal axis of symmetry.</p> | COULD | 8 | <ul style="list-style-type: none"> Create the "Mirror horizontal" and "Mirror vertical" options in the right click menu of a shape Implement the logic that mirrors the shape horizontally or vertically Implementation and execution of tests | 3 |

US29

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|--|--|----------|--------------|--|-----------|
| <p>As a user I want to stretch a shape horizontally or vertically So that I can modify the shape appearance</p> | <p>Given a selected shape When I stretched it in a direction (horizontally or vertically) Then it changes accordingly</p> | COULD | 8 | <ul style="list-style-type: none"> Create the "Stretch" options in the right click menu of a shape Implement the logic that stretches the shape Implementation and execution of tests | 3 |

US30

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|---|---|----------|--------------|--|-----------|
| As a user I want to be able to select more shapes with the mouse So that I can perform any operations on the selected shapes | Given a set of shapes When I select multiple shapes Then all selected shapes can be moved or modified together | COULD | 3 | <ul style="list-style-type: none"> Implement the logic that can select more than one shape Implementation and execution of tests | 3 |

US31

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|---|---|----------|--------------|--|-----------|
| As a user I want to group more than one selected shape So that I can do the same operations on all the selected shapes | Given a set of shapes When I select more than one and click 'Group' Then I group the selected shapes AND perform operations on them as if they were a single shape | WON'T | 5 | <ul style="list-style-type: none"> Create a "Group" option in the right click menu of a shape Implement the logic that performs the same operations on the selected shape Implementation and execution of tests | 3 |

US32

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|---|--|----------|--------------|---|-----------|
| As a user I want to ungroup the selected | Given a selected grouped shape When I click | WON'T | 5 | <ul style="list-style-type: none"> Create an "Ungroup" option in the | 3 |

| | | | | | |
|--|--|--|--|--|--|
| shapes So that I can operate on a single shape | 'Ungroup' Then the shapes become separate elements again | | | right click menu of a shape <ul style="list-style-type: none"> Implementation and execution of tests | |
|--|--|--|--|--|--|

US33

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|---|--|----------|--------------|---|-----------|
| As a user I want to add new shape creation commands So that I can create my own shapes | Given a drawing When I click 'New Shape Command' AND assign it a name Then the shape is saved in the command library with all its properties Given a created shape command When I click its associated button Then a copy of the original shape is inserted into the drawing exactly as it was when the command was created (not the current state if the shape has since changed or been deleted) | WON'T | 8 | <ul style="list-style-type: none"> Create a "New shape commands" option in the toolbar Create a field to write the name of the shape Implement the logic that saves a shape with the same properties as when it was created Implementation and execution of tests | 3 |

US34

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|---|---|----------|--------------|--|-------------|
| As a user I want to export a library of shapes created So that I can save my personal shapes | Given the saved shapes When I click 'Export library' Then a 'shapes library file' is created | WON'T | 8 | <ul style="list-style-type: none"> Create a "Export library" button in the toolbar Implement the logic that saves the personal shapes in a file Implementation and execution of tests | 3 partially |

US35

| Description | Acceptance Criteria | Priority | Story Points | Tasks | Sprint n. |
|--|---|----------|--------------|---|-------------|
| As a user I want to import a library of shapes created So that I can reuse my personal shapes | Given an existing 'shapes library file' When I click 'Import library' Then the saved shapes appear | WON'T | 8 | <ul style="list-style-type: none"> Create a "Import library" button in the toolbar Implement the logic that import the personal shapes from a saved file Implementation and execution of tests | 3 partially |

N.B. For the breakdown of the 35 User Stories into three Sprints, the team's capacity was estimated based on an average availability of about 32 hours per Sprint (4 team members × approx. 8 hours). For simplicity and planning purposes, we approximated 1 Story Point to roughly 1 hour of work, even though Story Points primarily represent relative effort and complexity, not time. Based on this, we distributed around 32 Story Points per Sprint to match the team's estimated capacity.

Since the total estimated points for all User Stories is about 118, it was necessary to select the main features to be implemented within the three Sprints, distributing about 32 Story Points for each.

In the first Sprint, the basic User Stories were included, which are necessary to allow the user to create, place and color simple shapes, as well as to save and load the drawing, editing operations (cut, copy, paste). Then US n. 1 through n. 18 will be implemented.

In the second Sprint, the User Stories inherent functionalities related to the management of the arrangement of overlapping shapes, supporting functionalities such as zoom and grid were provided. In addition, features such as text input, polygon creation and some of the figure distortion features will be handled.

Then US n. 19 through n. 26 will be implemented and n. 27 partially will be implemented.

Finally, the third Sprint was devoted to more advanced and complex features, such as figure grouping and custom shape export/import options.

Thus, will be completed US n. 27 and US n. 28 through n. 32 will be implemented.

US n. 33, n. 34 and n. 35 will, in addition, be initiated and remain in the backlog for possible later implementation.

This ensured a balanced distribution of the workload among the three Sprints, respecting the team's capabilities and the goal of implementing the main functionalities within the available time frame.

| Sprint n. | Total Story Points for Sprint |
|------------------|--------------------------------------|
| 1 | 32 |
| 2 | 32 |
| 3 | 30 + 2 |
| | <hr/> 96 |

1.2. Definition of Done

- The user story implementation meets ALL the acceptance criteria.
- The unit tests were written, executed and passed.
- All acceptance criteria have at least a test case.
- End-user documentation is available.
- All the code has been properly documented.
- All bugs fixed.

1.3. 1st sprint planning and backlog

| #US | Task | Assigned To | Status |
|-----|--|--|-------------|
| 1 | <ul style="list-style-type: none"> • Create an empty page of the program • Create a space for the tool bar | Iannone Davide | In Progress |
| 2 | <ul style="list-style-type: none"> • Create an event handler for the mouse | Petrone Gianluca | In Progress |
| 3 | <ul style="list-style-type: none"> • Create a segment line button in the toolbar • Implement the logic for segment line creation • Implementation and execution of tests | Interface: Iannone Davide Logic: Petrone Gianluca | In Progress |
| 4 | <ul style="list-style-type: none"> • Create rectangle shape button in the toolbar • Implement the logic for rectangle creation • Implementation and execution of tests | Interface: Iannone Davide Logic: Petrone Gianluca | In Progress |
| 5 | <ul style="list-style-type: none"> • Create ellipse shape button in the toolbar • Implement the logic for ellipse creation • Implementation and execution of tests | Interface: Iannone Davide Logic: Petrone Gianluca | In Progress |
| 6 | <ul style="list-style-type: none"> • Create a color icon for the color of the border of a shape • Add eight different colors in the color menu • Implement the logic that | Interface: Iannone Davide Logic: Petrone Gianluca | In Progress |

| | | | |
|----|--|--|-------------|
| | <p>after selecting the color and placing a shape, the border of the shape is coloured by the selected one</p> <ul style="list-style-type: none"> ● Implementation and execution of tests | | |
| 7 | <ul style="list-style-type: none"> ● Create a button for internal color ● Add eight different color in the color menu ● Implement the logic that after selecting the color and placing a closed shape, the interior of the shape is coloured by the selected one ● Implementation and execution of tests | <p>Interface: Iannone Davide Logic: Petrone Gianluca</p> | In Progress |
| 8 | <ul style="list-style-type: none"> ● Create the “Save” button in the toolbar ● Implement save logic for the save button ● Implementation and execution of tests | <p>Interface: Iannone Davide Logic: Petrone Gianluca</p> | In Progress |
| 9 | <ul style="list-style-type: none"> ● Create the “Load” button in the toolbar ● Implement load logic for the load button ● Implementation and execution of tests | <p>Interface: Iannone Davide Logic: Petrone Gianluca</p> | In Progress |
| 10 | <ul style="list-style-type: none"> ● Implement the logic to manage the click on a shape ● Implementation and execution of tests | Lomazzo Noemi | In Progress |
| 11 | <ul style="list-style-type: none"> ● Create a menu for right click on the window ● Create “Delete” button in the right click menu ● Implement the logic to delete the shape ● Implementation and execution of tests | <p>Interface: Sirica Simone Logic: Lomazzo Noemi</p> | In Progress |
| 12 | <ul style="list-style-type: none"> ● Add handler for mouse drag | Lomazzo Noemi | In Progress |

| | | | |
|----|---|--|-------------|
| | functions <ul style="list-style-type: none"> • Implementation and execution of tests | | |
| 13 | <ul style="list-style-type: none"> • Implement the logic for changing the color of a placed shape • Implementation and execution of tests | Lomazzo Noemi | In Progress |
| 14 | <ul style="list-style-type: none"> • Create size field in the right click menu • Implement the logic to manage the resize of a shape • Implementation and execution of tests | Interface: Iannone Davide Logic: Petrone Gianluca | In Progress |
| 15 | <ul style="list-style-type: none"> • Create the “Cut” button in the right click menu • Implement the logic linked to the cut button to cut a shape • Implementation and execution of tests | Interface: Sirica Simone Logic: Lomazzo Noemi | In Progress |
| 16 | <ul style="list-style-type: none"> • Create the “Copy” button in the right click menu • Implement the logic linked to the copy button to copy a shape • Implementation and execution of tests | Interface: Sirica Simone Logic: Lomazzo Noemi | In Progress |
| 17 | <ul style="list-style-type: none"> • Create the “Paste” button in the right click menu • Implement the logic linked to the paste button to paste a shape • Implementation and execution of tests | Interface: Sirica Simone Logic: Lomazzo Noemi | In Progress |
| 18 | <ul style="list-style-type: none"> • Create the “undo” button in the interface • Implement the logic of the button, that delete the last operation done • Implementation and execution of tests | Sirica Simone | In Progress |

| | | | |
|----|--|---|-------|
| 19 | <ul style="list-style-type: none"> • Create the “to the front” option when a shape is selected • Implement the logic that places the selected shape to the front • Implementation and execution of tests | - | To Do |
| 20 | <ul style="list-style-type: none"> • Create the “to the back” option when a shape is selected • Implement the logic that places the selected shape to the back • Implementation and execution of tests | - | To Do |
| 21 | <ul style="list-style-type: none"> • Create the “zoom in” and “zoom out” buttons in the interface • Implement “zoom in” button that, for every click, zoom in the interface • Implement the “zoom out” button that, for every click zooms out on the interface • Implementation and execution of tests | - | To Do |
| 22 | <ul style="list-style-type: none"> • Create a horizontal scrollbar at the bottom of the window • Create a vertical scrollbar at the right of the window • Implementation and execution of tests | - | To Do |
| 23 | <ul style="list-style-type: none"> • Create a “toggle grid” button in the toolbar • Implement the logic of the button that shows or hides a grid • Implementation and execution of tests | - | To Do |
| 24 | <ul style="list-style-type: none"> • Create a “grid size” option in the toolbar • Implement the logic that | - | To Do |

| | | | |
|----|--|---|-------|
| | change the size of the grid <ul style="list-style-type: none"> ● Implementation and execution of tests | | |
| 25 | <ul style="list-style-type: none"> ● Create a “Polygon” option in the toolbar ● Create the logic that connects the selected points creating a closed shape ● Implementation and execution of tests | - | To Do |
| 26 | <ul style="list-style-type: none"> ● Create a “text” option in the toolbar ● Create a field to write a text string ● Create a field to choose the size of a text string ● Implement the logic that places a text in the chosen point ● Implementation and execution of tests | - | To Do |
| 27 | <ul style="list-style-type: none"> ● Create a “Rotate” option in the right click menu of a shape ● Create a field in the “Rotate” option where an angle can be specified ● Implement the logic that rotates the selected shape at the chosen angle ● Implementation and execution of tests | - | To Do |
| 28 | <ul style="list-style-type: none"> ● Create the “Mirror horizontal” and “Mirror vertical” options in the right click menu of a shape ● Implement the logic that mirrors the shape horizontally or vertically ● Implementation and execution of tests | - | To Do |
| 29 | <ul style="list-style-type: none"> ● Create the “Stretch” options in the right click menu of a | - | To Do |

| | | | |
|----|---|---|-------|
| | shape <ul style="list-style-type: none"> ● Implement the logic that stretches the shape ● Implementation and execution of tests | | |
| 30 | <ul style="list-style-type: none"> ● Implement the logic that can select more than one shape ● Implementation and execution of tests | - | To Do |
| 31 | <ul style="list-style-type: none"> ● Create a “Group” option in the right click menu of a shape ● Implement the logic that performs the same operations on the selected shape ● Implementation and execution of tests | - | To Do |
| 32 | <ul style="list-style-type: none"> ● Create an “Ungroup” option in the right click menu of a shape ● Implementation and execution of tests | - | To Do |
| 33 | <ul style="list-style-type: none"> ● Create a “New shape commands” option in the toolbar ● Create a field to write the name of the shape ● Implement the logic that saves a shape with the same properties as when it was created ● Implementation and execution of tests | - | To Do |
| 34 | <ul style="list-style-type: none"> ● Create a “Export library” button in the toolbar ● Implement the logic that saves the personal shapes in a file ● Implementation and execution of tests | - | To Do |
| 35 | <ul style="list-style-type: none"> ● Create a “Import library” | - | To Do |

| | | | |
|--|--|--|--|
| | <div>button in the toolbar</div> <ul style="list-style-type: none">● Implement the logic that import the personal shapes from a saved file● Implementation and execution of tests | | |
|--|--|--|--|

1.4. Technologies, Languages, Frameworks & Conventions

Technologies and tools

Programming Language -> Java

Framework -> JavaFX

IDE -> Netbeans

Gui Builder -> Scene Builder

Testing -> JUnit (via Maven)

Board -> Trello

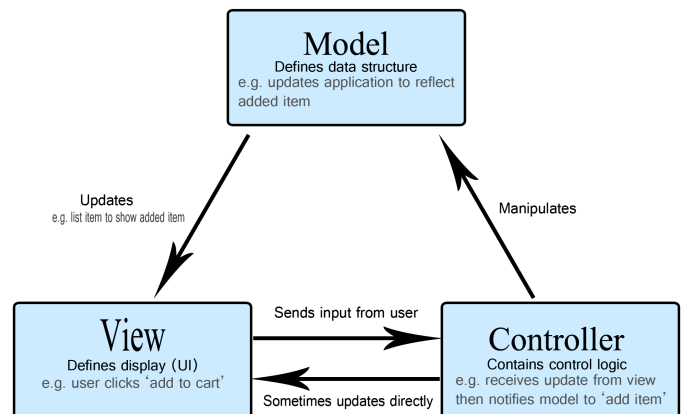
Conventions

- Standard Java style (camelCase for methods and variables, PascalCase for classes)
- Variable names in English, meaningful and consistent

1.5. Description of software architecture and selected design pattern

The architecture we use in this software is the MVC (Model - View - Controller). The MVC consists in three different parts:

- View, that renders the model and corresponds to the User Interface where the user can interact with.
- Model, that represents the data and encapsulates the application state. It notifies the view of changes.
- Controller, that defines the application behaviour and updates the model according to the user actions.



We adopt this pattern to separate model (data) from view to improve the separation of concerns and to achieve loose coupling.

To increase understanding of the basic principles of object-oriented design and to make software systems easier to modify while increasing maintainability, certain design patterns were chosen.

In particular:

- Factory for the creation of the shapes. The **ShapeFactory** class takes care of building the shapes requested by the user, preventing the constructors of specific classes from being used directly in the code. This way, if we want to add new shapes in the future, we can easily do so without modifying other parts of the program;
- Operations such as adding, moving, deleting or coloring a shape are handled by **command** objects. Each operation is saved and can be undone or repeated (undo/redo functionality);
- To allow multiple shapes to be grouped and treated as a single entity (e.g., to move them together), we used the **Composite** pattern. The ShapeGroup class contains multiple Shape objects within it, but it can be used as if it were a normal shape. This allows us to apply the same operations to both individual shapes and groups;
- The **Decorator** pattern allowed us to add extra functionality to shapes, such as border color or fill color;
- For transformations (e.g. rotating or stretching a shape) we used the **Strategy** pattern, so that each transformation is treated as a separate strategy.

1.6. Mock-up Interface

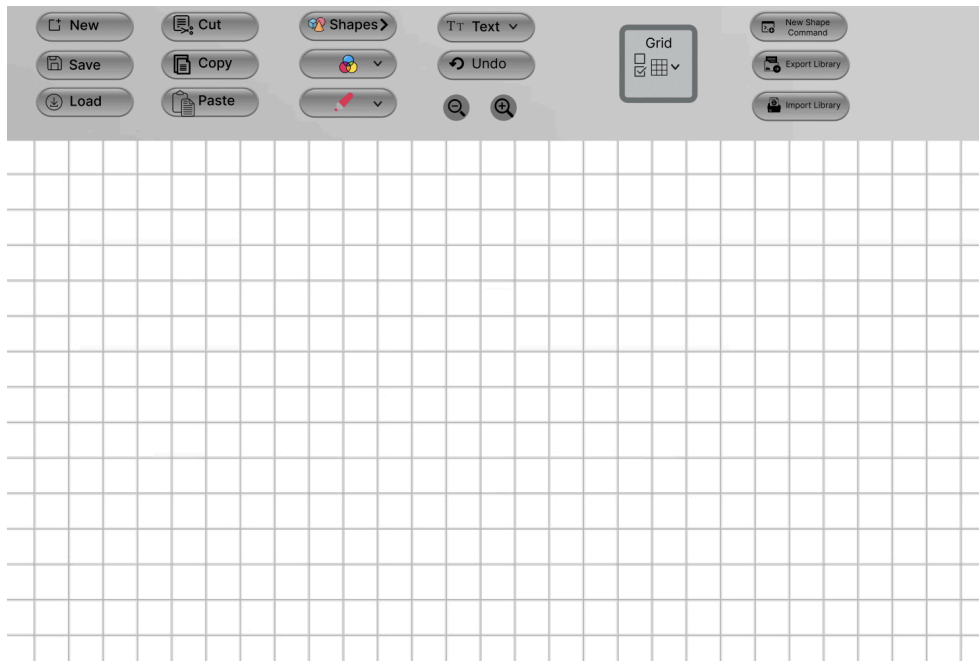


Figura 1: Empty canvas

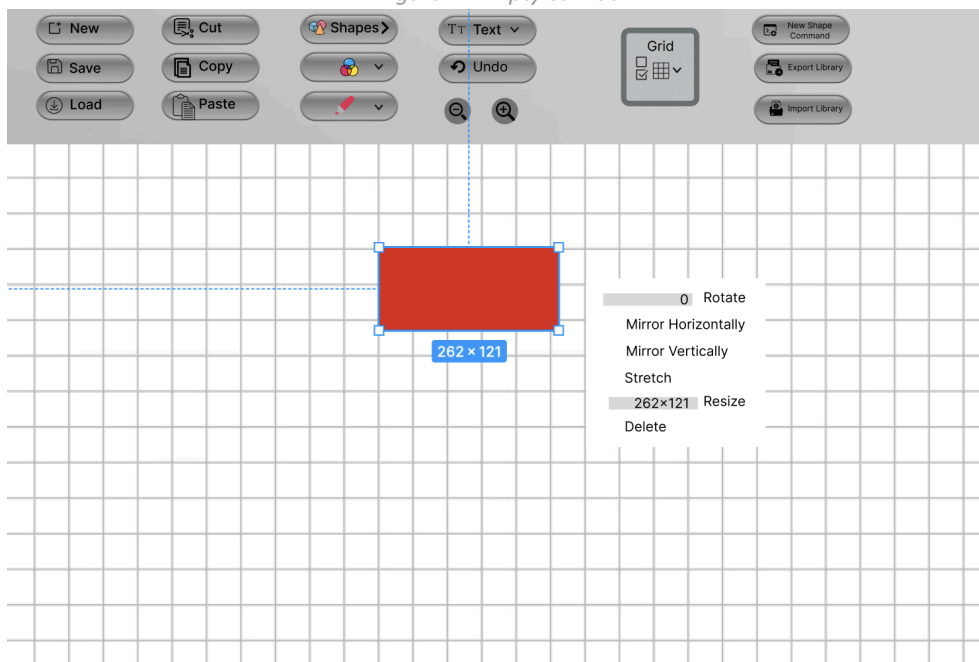
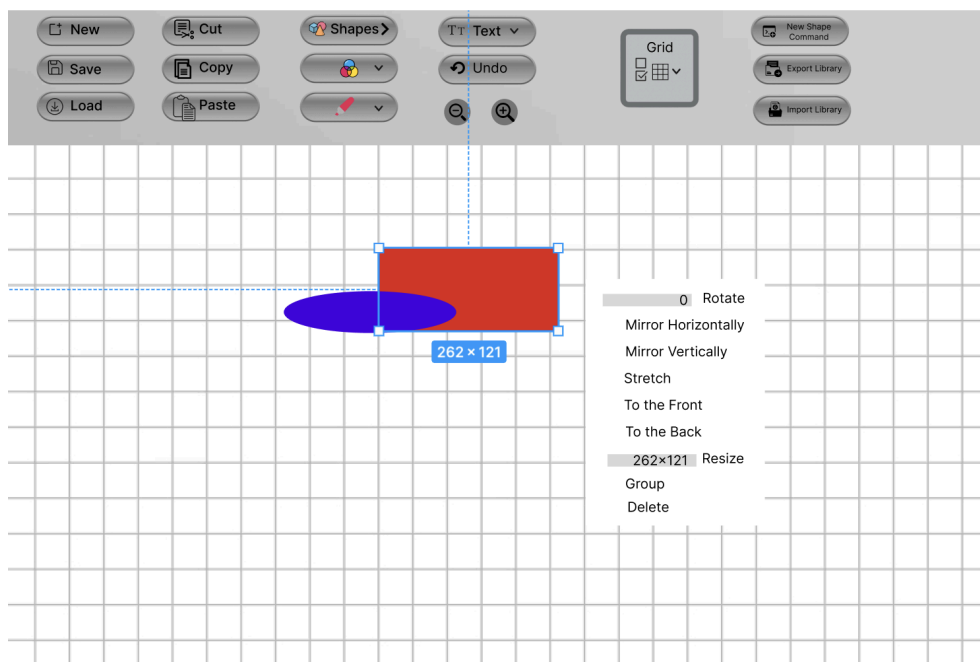
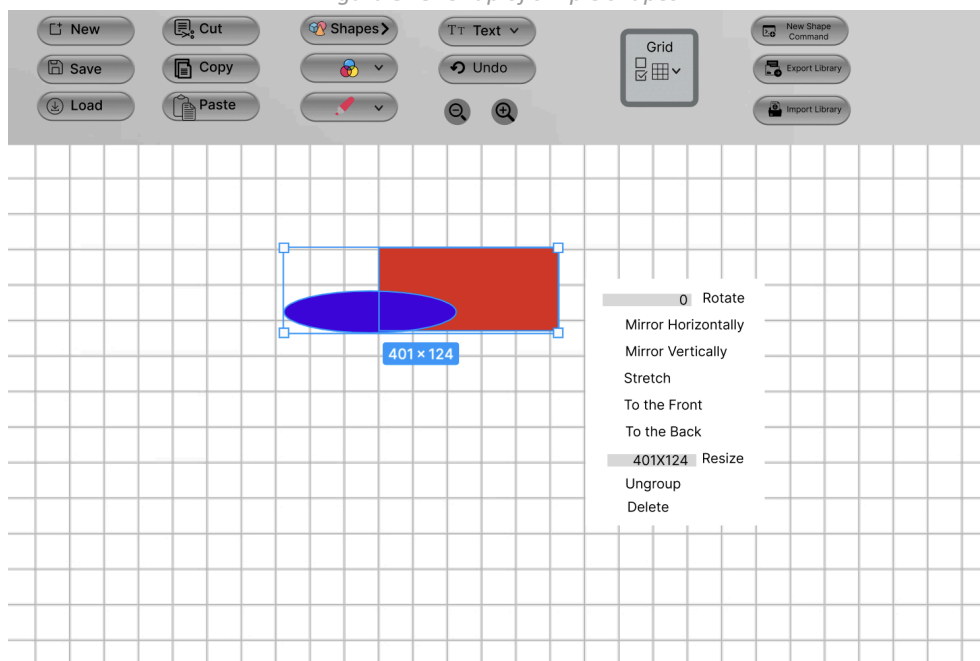
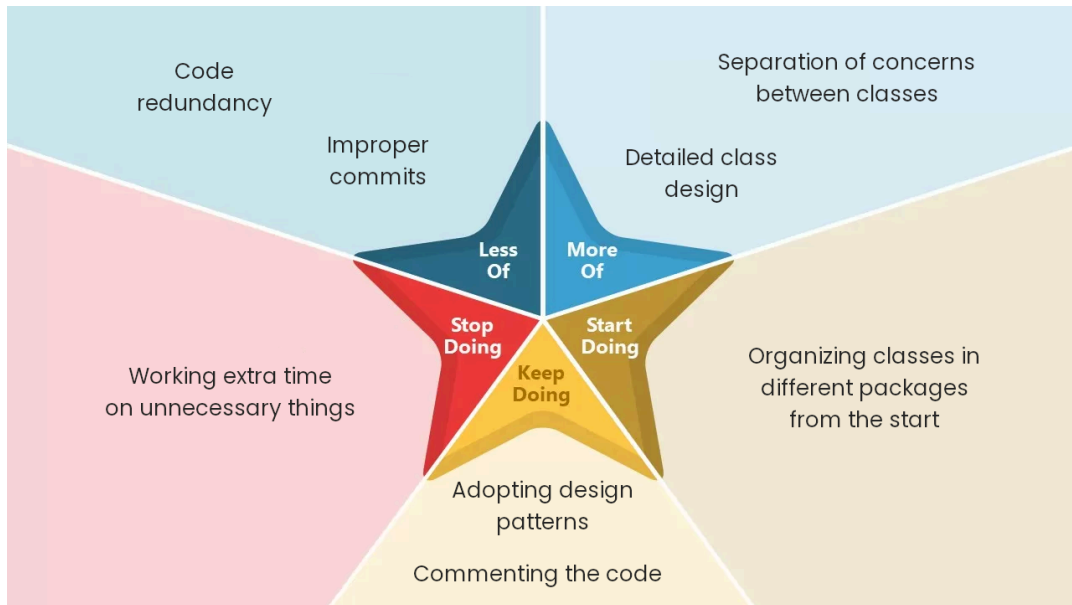


Figura 2: Simple shape options

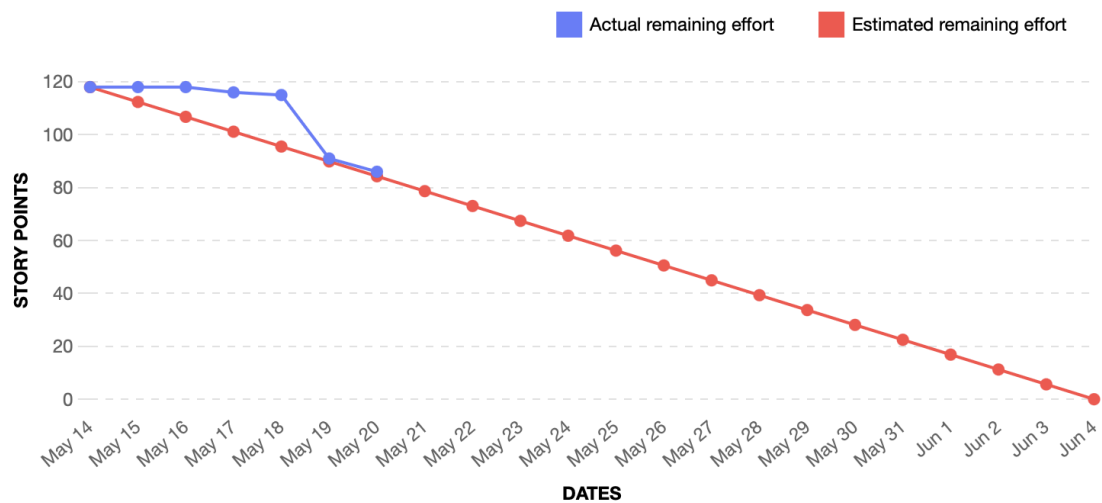
*Figura 3: Overlap of simple shapes**Figura 4: Grouping of simple shapes*



2.2. 1st Sprint retrospective



2.3. Burndown chart



2.4. 2nd Sprint backlog

| #US | Task | Assigned To | Status |
|-----|--|--|--------|
| 1 | <ul style="list-style-type: none"> Create an empty page of the program Create a space for the tool bar | Iannone Davide | Done |
| 2 | <ul style="list-style-type: none"> Create an event handler for the mouse | Petrone Gianluca | Done |
| 3 | <ul style="list-style-type: none"> Create a segment line button in the toolbar Implement the logic for segment line creation Implementation and execution of tests | Interface: Iannone Davide Logic: Petrone Gianluca | Done |
| 4 | <ul style="list-style-type: none"> Create rectangle shape button in the toolbar Implement the logic for rectangle creation Implementation and execution of tests | Interface: Iannone Davide Logic: Petrone Gianluca | Done |
| 5 | <ul style="list-style-type: none"> Create ellipse shape button in the toolbar Implement the logic for ellipse creation Implementation and execution of tests | Interface: Iannone Davide Logic: Petrone Gianluca | Done |
| 6 | <ul style="list-style-type: none"> Create a color icon for the color of the border of a shape Add eight different colors in the color menu Implement the logic that after selecting the color and placing a shape, the border of the shape is coloured by the selected one Implementation and execution of tests | Interface: Iannone Davide Logic: Petrone Gianluca | Done |
| 7 | <ul style="list-style-type: none"> Create a button for internal | Interface: Iannone Davide | Done |

| | | | |
|----|--|--|------|
| | color <ul style="list-style-type: none"> • Add eight different color in the color menu • Implement the logic that after selecting the color and placing a closed shape, the interior of the shape is coloured by the selected one • Implementation and execution of tests | Logic: Petrone Gianluca | |
| 8 | <ul style="list-style-type: none"> • Create the “Save” button in the toolbar • Implement save logic for the save button • Implementation and execution of tests | Interface: Iannone Davide Logic: Petrone Gianluca | Done |
| 9 | <ul style="list-style-type: none"> • Create the “Load” button in the toolbar • Implement load logic for the load button • Implementation and execution of tests | Interface: Iannone Davide Logic: Petrone Gianluca | Done |
| 10 | <ul style="list-style-type: none"> • Implement the logic to manage the click on a shape • Implementation and execution of tests | Lomazzo Noemi | Done |
| 11 | <ul style="list-style-type: none"> • Create a menu for right click on the window • Create “Delete” button in the right click menu • Implement the logic to delete the shape • Implementation and execution of tests | Interface: Sirica Simone Logic: Lomazzo Noemi | Done |
| 12 | <ul style="list-style-type: none"> • Add handler for mouse drag functions • Implementation and execution of tests | Lomazzo Noemi | Done |
| 13 | <ul style="list-style-type: none"> • Implement the logic for changing the color of a placed shape • Implementation and | Lomazzo Noemi | Done |

| | | | |
|----|---|--|-------------|
| | execution of tests | | |
| 14 | <ul style="list-style-type: none"> • Create size field in the right click menu • Implement the logic to manage the resize of a shape • Implementation and execution of tests | Interface: Iannone Davide Logic: Petrone Gianluca | Done |
| 15 | <ul style="list-style-type: none"> • Create the “Cut” button in the right click menu • Implement the logic linked to the cut button to cut a shape • Implementation and execution of tests | Interface: Sirica Simone Logic: Lomazzo Noemi | Done |
| 16 | <ul style="list-style-type: none"> • Create the “Copy” button in the right click menu • Implement the logic linked to the copy button to copy a shape • Implementation and execution of tests | Interface: Sirica Simone Logic: Lomazzo Noemi | Done |
| 17 | <ul style="list-style-type: none"> • Create the “Paste” button in the right click menu • Implement the logic linked to the paste button to paste a shape • Implementation and execution of tests | Interface: Sirica Simone Logic: Lomazzo Noemi | Done |
| 18 | <ul style="list-style-type: none"> • Create the “undo” button in the interface • Implement the logic of the button, that delete the last operation done • Implementation and execution of tests | Sirica Simone | Done |
| 19 | <ul style="list-style-type: none"> • Create the “to the front” option when a shape is selected • Implement the logic that places the selected shape to the front • Implementation and execution of tests | Interface: Sirica Simone Logic: Lomazzo Noemi | In Progress |

| | | | |
|----|--|---|-------------|
| 20 | <ul style="list-style-type: none"> • Create the “to the back” option when a shape is selected • Implement the logic that places the selected shape to the back • Implementation and execution of tests | Interface: Sirica Simone Logic: Lomazzo Noemi | In Progress |
| 21 | <ul style="list-style-type: none"> • Create the “zoom in” and “zoom out” buttons in the interface • Implement “zoom in” button that, for every click, zoom in the interface • Implement the “zoom out” button that, for every click zooms out on the interface • Implementation and execution of tests | Interface: Sirica Simone Logic: Lomazzo Noemi | In Progress |
| 22 | <ul style="list-style-type: none"> • Create a horizontal scrollbar at the bottom of the window • Create a vertical scrollbar at the right of the window • Implementation and execution of tests | Interface: Sirica Simone Logic: Petrone Gianluca | In Progress |
| 23 | <ul style="list-style-type: none"> • Create a “toggle grid” button in the toolbar • Implement the logic of the button that shows or hides a grid • Implementation and execution of tests | Interface: Sirica Simone Logic: Lomazzo Noemi | In Progress |
| 24 | <ul style="list-style-type: none"> • Create a “grid size” option in the toolbar • Implement the logic that change the size of the grid • Implementation and execution of tests | Interface: Sirica Simone Logic: Iannone Davide | In Progress |
| 25 | <ul style="list-style-type: none"> • Create a “Polygon” option in the toolbar • Create the logic that connects the selected points creating a closed shape | Interface: Sirica Simone Logic: Iannone Davide | In Progress |

| | | | |
|----|--|---|-----------------------|
| | <ul style="list-style-type: none"> Implementation and execution of tests | | |
| 26 | <ul style="list-style-type: none"> Create a “text” option in the toolbar Create a field to write a text string Create a field to choose the size of a text string Implement the logic that places a text in the chosen point Implementation and execution of tests | Interface: Sirica Simone Logic: Iannone Davide | In Progress |
| 27 | <ul style="list-style-type: none"> Create a “Rotate” option in the right click menu of a shape Create a field in the “Rotate” option where an angle can be specified Implement the logic that rotates the selected shape at the chosen angle Implementation and execution of tests | Interface: Sirica Simone Logic: Petrone Gianluca | In Progress/ To Do |
| 28 | <ul style="list-style-type: none"> Create the “Mirror horizontal” and “Mirror vertical” options in the right click menu of a shape Implement the logic that mirrors the shape horizontally or vertically Implementation and execution of tests | - | To Do |
| 29 | <ul style="list-style-type: none"> Create the “Stretch” options in the right click menu of a shape Implement the logic that stretches the shape Implementation and execution of tests | - | To Do |
| 30 | <ul style="list-style-type: none"> Implement the logic that can select more than one shape Implementation and | - | To Do |

| | | | |
|----|---|---|-------|
| | execution of tests | | |
| 31 | <ul style="list-style-type: none"> • Create a “Group” option in the right click menu of a shape • Implement the logic that performs the same operations on the selected shape • Implementation and execution of tests | - | To Do |
| 32 | <ul style="list-style-type: none"> • Create an “Ungroup” option in the right click menu of a shape • Implementation and execution of tests | - | To Do |
| 33 | <ul style="list-style-type: none"> • Create a “New shape commands” option in the toolbar • Create a field to write the name of the shape • Implement the logic that saves a shape with the same properties as when it was created • Implementation and execution of tests | - | To Do |
| 34 | <ul style="list-style-type: none"> • Create a “Export library” button in the toolbar • Implement the logic that saves the personal shapes in a file • Implementation and execution of tests | - | To Do |
| 35 | <ul style="list-style-type: none"> • Create a “Import library” button in the toolbar • Implement the logic that import the personal shapes from a saved file • Implementation and execution of tests | - | To Do |