SOFTWARE REQUIREMENTS SPECIFICATION

Blix - AI Photo Editor

The Spanish Inquisition

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Introduction

Blix is a native cross-platform desktop application designed to provide users with a powerful and intuitive photo editing experience.

Purpose and Vision

In photography, editing is an essential part of the process. However, it can be time-consuming and daunting, especially for those unfamiliar with the techniques and software.

Blix is a native, cross-platform desktop application designed to give users a powerful, intuitive photo editing experience. It enables users to edit photos using a node-based system, which describes the image processing pipeline. This offers creative control to professionals, while still being intuitive for novice users.

The system provides functionality for basic photo editing operations, like white balance and saturation. It also has advanced operations, such as image segmentation, which allows users to edit selected objects individually and provides infilling.

Users can customize the themes and layout of the application. The viewport is splittable and users can arrange components throughout the window layout. It has a command palette which enables users to efficiently navigate and control the system. This allows users to change themes, add nodes to the graph, manage projects and more. It also has a custom AI prompt box where users can describe their vision of the image, which will then be processed to generate a result.

The system also allows users to sync their photo editing projects and user preferences to the cloud, including window layout, keymap settings and themes.

User Stories and Characteristics

Characteristics

Novice Users

Novice users are typically individuals who have little to no experience with photo editing software. They may be unfamiliar with the terminology and tools used in the application, and may require guidance and assistance with basic tasks such as importing and exporting photos, adjusting brightness and contrast, cropping and resizing images, and applying filters and effects. Novice users may also be less comfortable with technology in general, and may require a more intuitive and user-friendly interface to help them navigate the application.

Intermediate Users

An intermediate user is someone who has a good understanding of the basic features and tools of the application, but may not be familiar with more advanced techniques. They are likely to have experience with editing photos and may have used similar applications before. They are comfortable navigating the interface and using tools such as crop, resize, and color adjustments. They may also be interested in learning more advanced techniques such as layering, masking, and retouching to enhance their photos.

Professional Users

A professional user of a photo editing application is typically someone who has a deep understanding of photography and image editing techniques. They are likely to have experience using a variety of photo editing software and are proficient in using advanced features such as layers, masks, and color correction tools. They may work in fields such as graphic design, advertising, or photography and require a high level of precision and control over their edits. Professional users may also value features such as batch processing and the ability to work with large files or RAW image formats. They may also prioritize software that integrates well with other tools in their workflow, such as design software or cloud storage services.

Stories

Novice users

I want the application to have a simple and intuitive interface, so that I can easily navigate and understand how to use it.

I want the application to provide basic editing tools, such as crop and rotate, so that I can quickly make simple adjustments to my photos.

I want the application to offer a variety of pre-set filters and effects, so that I can easily enhance the look of my photos without needing to learn advanced editing techniques.

Intermediate users

I want the application to offer more advanced editing tools, such as levels and curves, so that I can fine-tune the exposure and color of my photos.

I want the application to provide a range of creative options, such as overlays and textures, so that I can experiment with different styles and effects.

I want the application to provide easy sharing options, so that I can quickly post my edited photos to my favorite platforms.

I want to be able to upload and edit multiple photos at once.

I want to be able to adjust advanced settings such as white balance, hue, exposure, cropping, and rotating manually.

I want to be able to select objects in the image using image segmentation and edit them separately.

I want to be able to search for projects by the content of the images inside of them.

I want to be able to customize the panel layout to my preference.

Professional users

I want the application to offer advanced retouching tools, such as frequency separation and dodge and burn, so that I can make precise adjustments to my photos.

I want the application to support high-resolution files and offer advanced color management options, so that I can create professional-quality designs.
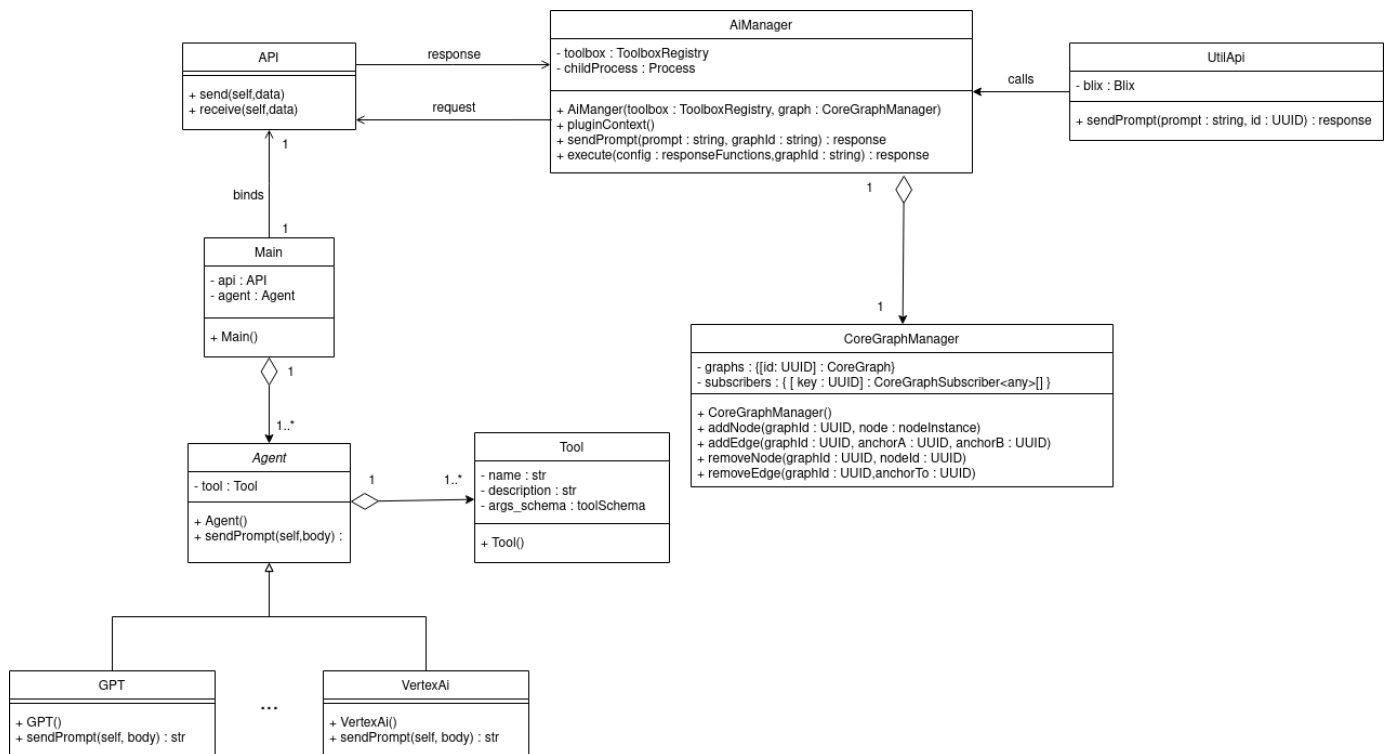
I want the application to provide batch processing and automation options, so that I can quickly edit and optimize large numbers of photos for use in campaigns and advertisements.
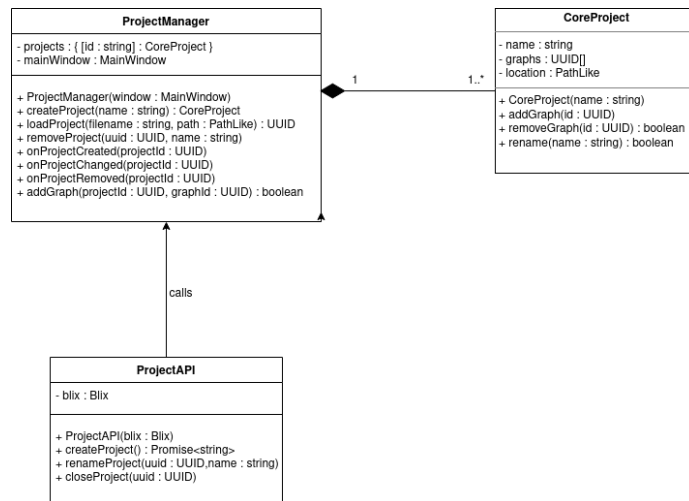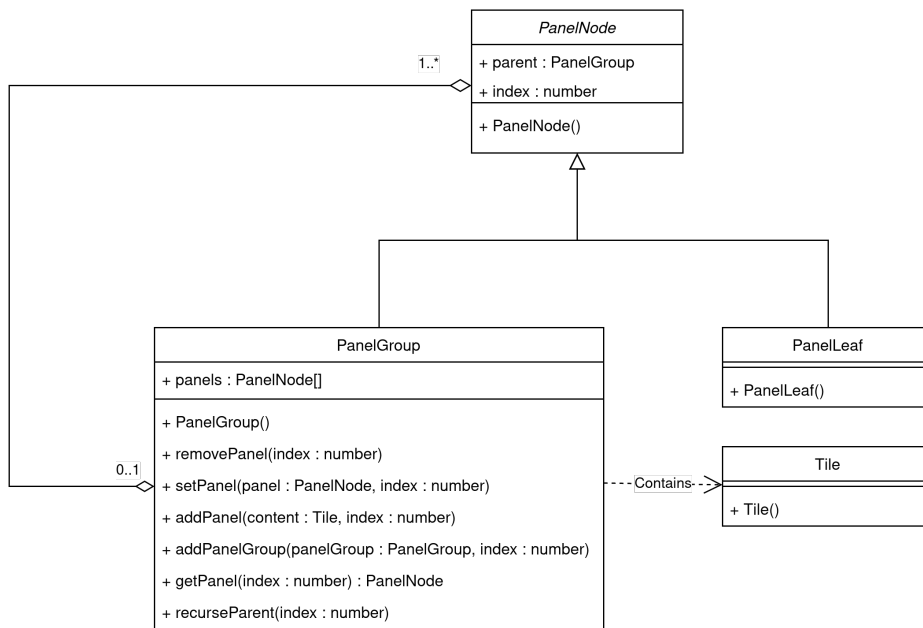
Class Diagrams

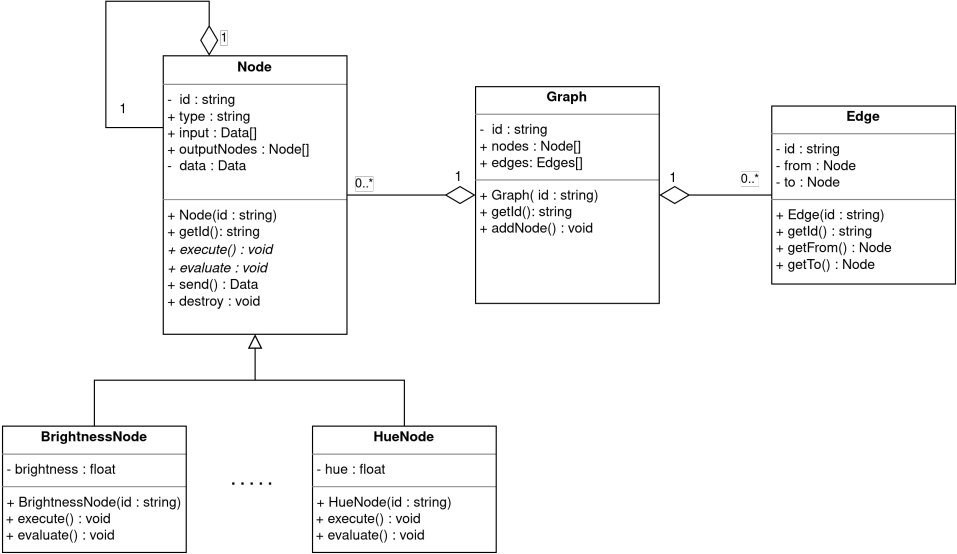**Node Builder Subsystem**
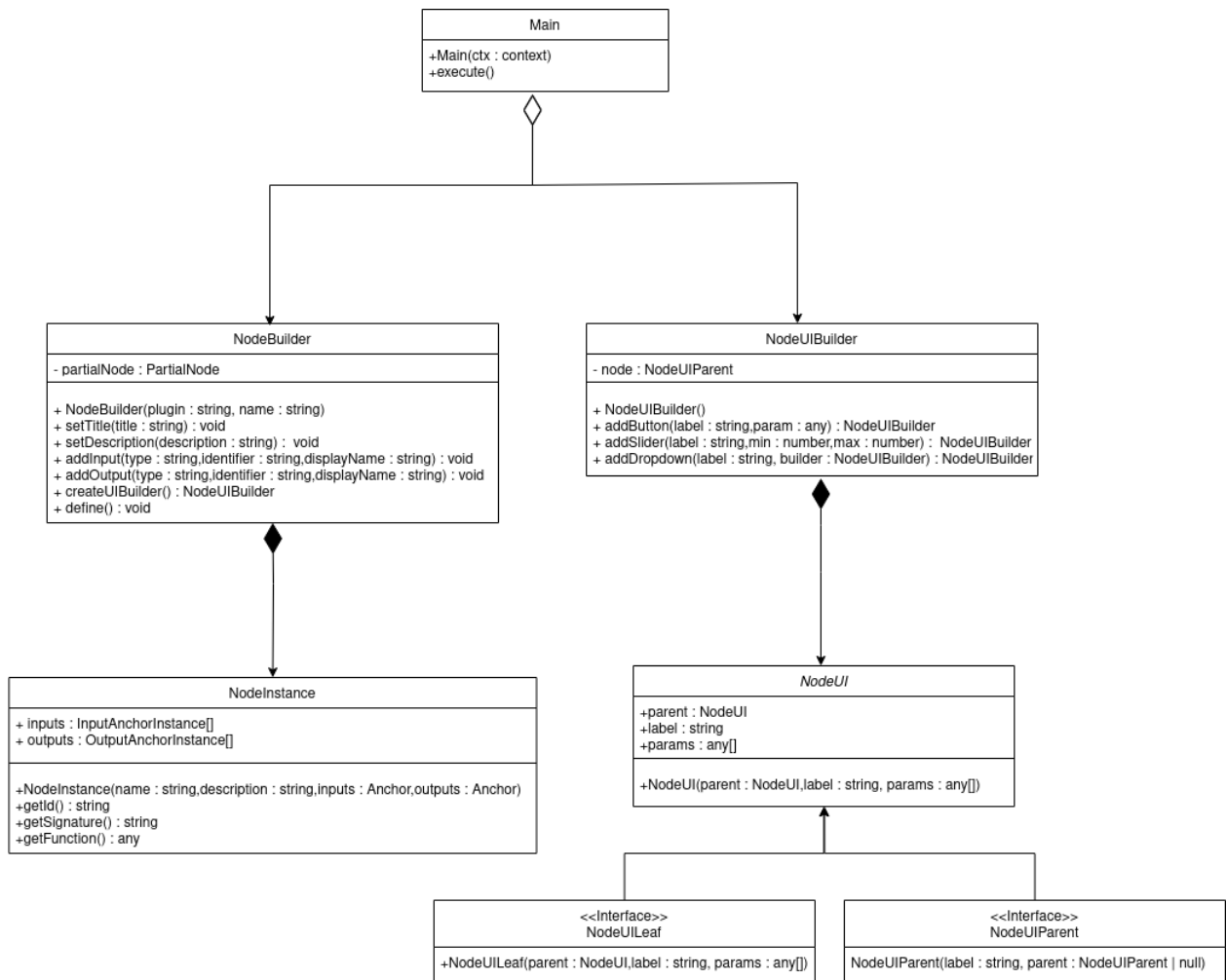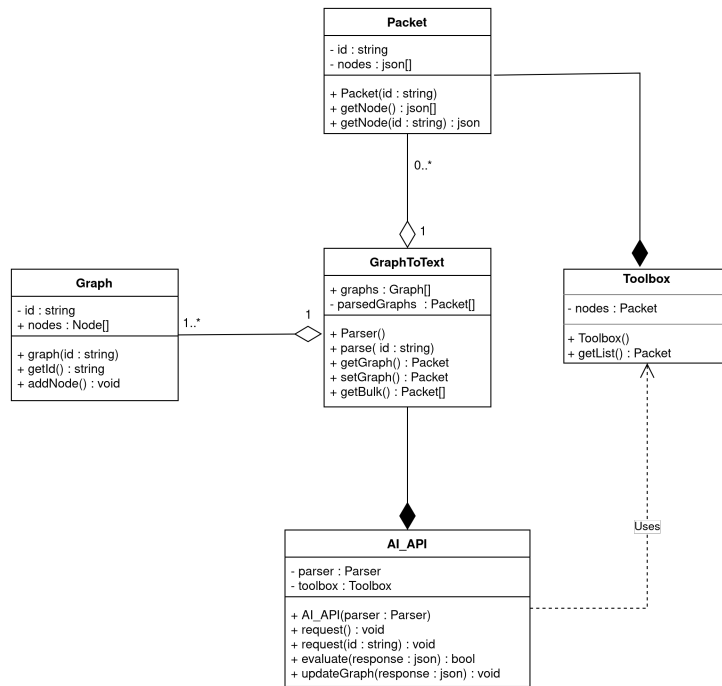
AI Subsystem

Project Management Subsystem

Layout Subsystem

Graph Management Subsystem

NLP Subsystem

Packet

- id : string
- nodes : json[]

+ Packet(id : string)
+ getNode() : json[]
+ getNode(id : string) : json

0..*

1

GraphToText

+ graphs : Graph[]
- parsedGraphs : Packet[]

+ Parser()
+ parse(id : string)
+ getGraph() : Packet
+ setGraph() : Packet
+ getBulk() : Packet[]

Graph

- id : string
+ nodes : Node[]

+ graph(id : string)
+ getId() : string
+ addNode() : void

1..*   1

Toolbox

- nodes : Packet

+ Toolbox()
+ getList() : Packet

AI_API

- parser : Parser
- toolbox : Toolbox

+ AI_API(parser : Parser)
+ request() : void
+ request(id : string) : void
+ evaluate(response : json) : bool
+ updateGraph(response : json) : void

Uses

User Management Subsystem

Functional Requirements

Requirements

Requirements with a * next to it represents optional and *nice to have* requirements.

1. Project Management

    1.1. Users should be able to import a single photo as well as multiple photos.

    1.2. The system should be able to export the unedited images and the edited images.

    1.3. The system should store projects and retrieve projects from local storage.

    1.4. The system should be able to sync projects to the cloud. *

    1.5. The system should allow the user to revert changes.

    1.6. Users should be able to efficiently switch between and work on multiple projects.

    1.7. Users should be able to share their projects, images, and graphs.

2. Layout

    2.1. Users should be able to view the changes they made to the original image, either with a button or slider.

    2.2. With the use of image segmentation the users should be able select objects in the image by pressing on the object.

    2.3. Users should be able to customize the layout tiles to fit their preference.

    2.4. System should be able to display multiple graphs and photos

    2.5. System should have a command palette to to provide easy access to tools.

3. Graph Management

    3.1. Add nodes

    3.2. Remove nodes

    3.3. Manipulate node positions

    3.4. Anchor nodes to each other to create a logical data flow

    3.5. Change the properties and values of nodes

    3.6. System should contain a collision detection algorithm to place the nodes on the graph

    3.7. Cycle detection algorithm to indicate invalid connections

4. Plugin Management

    4.1. Users should be able to create their own plugins

    4.2. Users should be able to load plugins of their choice

    4.3. Users should be able to load plugins in real time

    4.4. Plugin functionality should be available in real time once the plugin is loaded

5. Natural Language Processing to Graph *

    5.1. Generated graph should conform to a specific grammar

    5.2. User should be able to describe an edit the image. which should be processed to generate a functional graph.

6. Photo Processing and Graph Interpreter

    6.1. The system should be able to support multiple different image formats/file types, such as jpeg, png, svg etc

    6.2. Users should be able to edit the photos manually with the standard features such as adjusting the white balance, hue, and exposure etc.

    6.3. Users should be able to edit a selected object in the image the same way one would edit the rest of the image.

   6.4. System should be able to do object segmentation.

7. User Administration

    7.1. Register and sign in with multiple providers

    7.2. View and manage account details

    7.3. View and manage list of projects

    7.4. Manage syncing of projects, layouts and user settings across multiple devices*
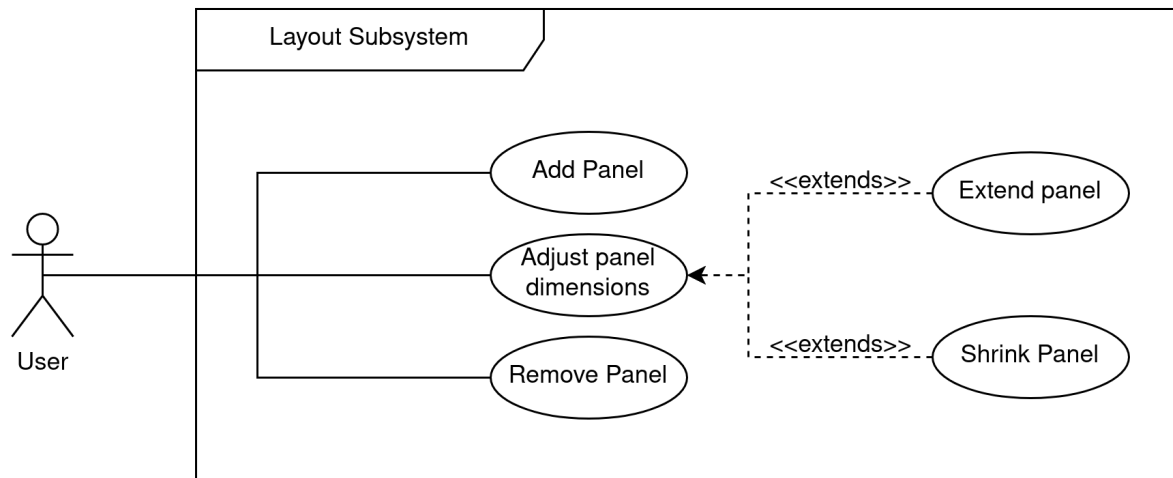
Subsystems

1. Project Management

2. Layout

3. Graph Management

4. Plugin Management

5. Natural Language Processing to Graph

6. Photo Processing & Graph Interpreter

7. User Administration

Use Case Diagrams

Project Management Subsystem
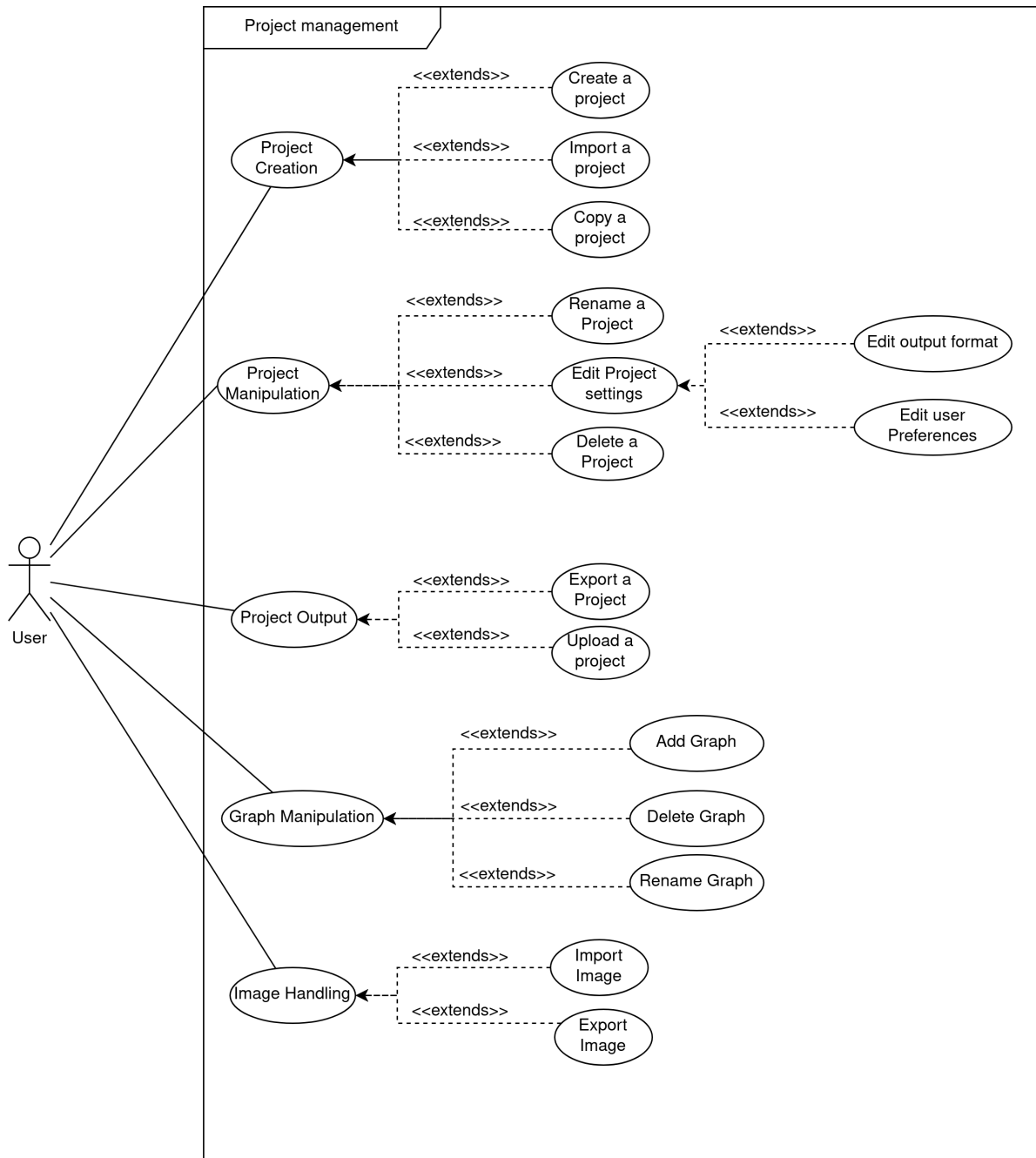
Layout Subsystem

Layout Subsystem
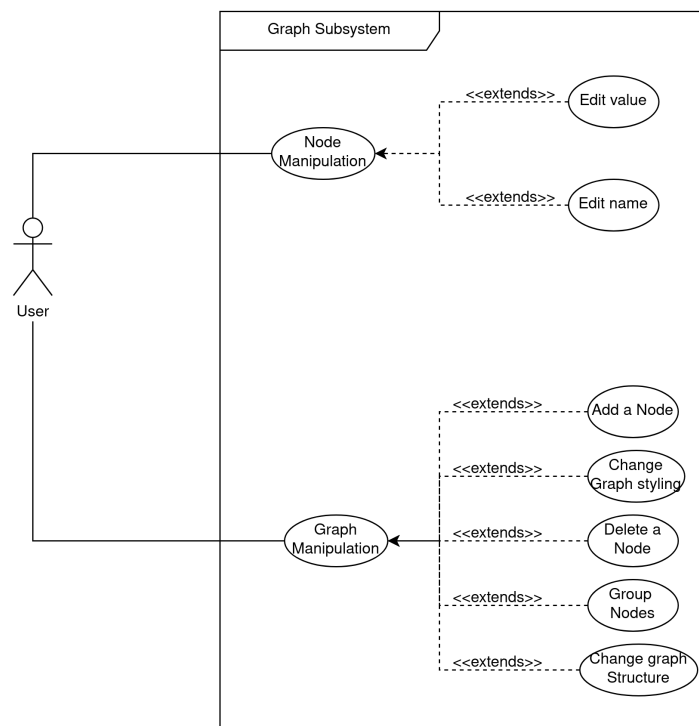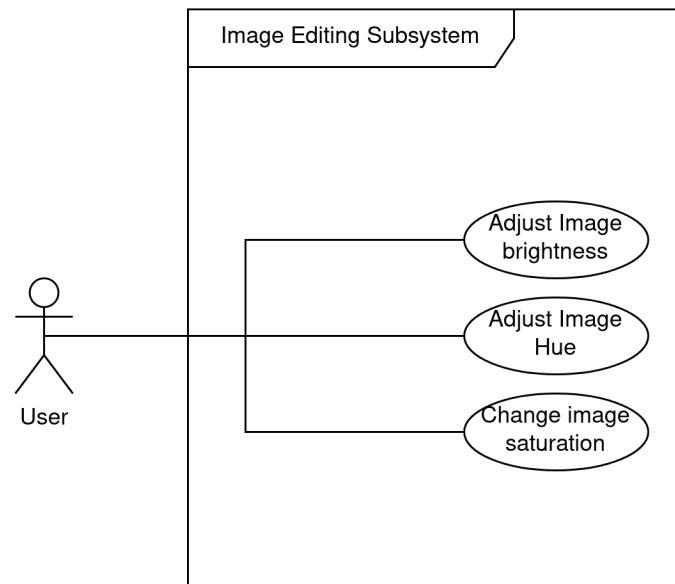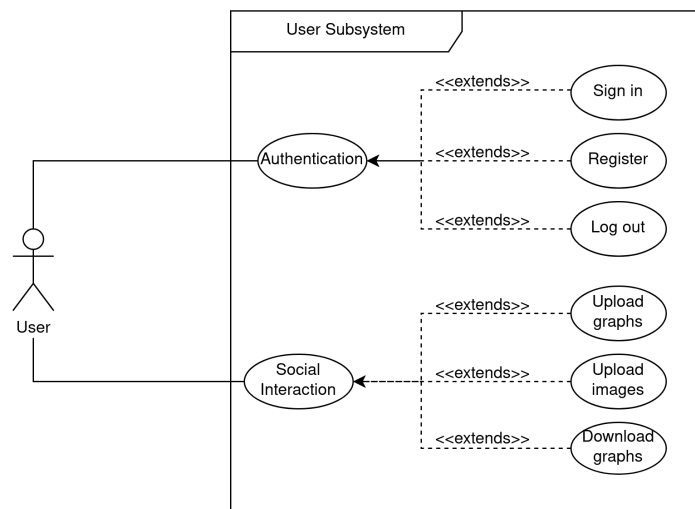

Graph Management Subsystem

Image Processing Subsystem

User Management Subsystem

Quality Requirements

Performance

Performance is pivotal to the success of this project. A bad performing system will severly hamper the user experience and will make the systems survival unfeasible. Due to the nature of photo editing, the system should be able to handle large images and projects without significant lag or delay, thus it is vital that these tasks are not just performed well, but exceedingly well to ensure a good user experience.

Quantification

Performance is quantified by the maximum processing time for standard photo editing operations. The Throughput and resource utilization of the system must also be investigated for the purposes of the Blix system.

The maximum processing time of the system is measured by the time it takes to perform a standard photo editing operation immediately after the user has requested the operation. The standard photo editing operations are defined as the following:

1. Adjusting the white balance

2. Adjusting the hue

3. Adjusting the exposure

4. Adjusting the saturation

5. Rotating the image

6. Cropping the image

7. Applying a filter to the image

The throughput of the system is measured by the number of standard photo editing operations that can be performed in a given time period.

The resource utilization of the system is measured by the amount of memory and CPU usage of the system during runtime.

Targets

The target maximum processing time of the system is 1 second for a standard photo editing operations

The target throughput of the system is 5 standard photo editing operations per second.

The target resource utilization of the system is :

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1. Less than 100 MB of memory and 10% CPU usage for the minor photo editing operations

2. 500MB of memory and 50% CPU usage for the standard photo editing operations.

3. 1GB of memory and less than 90% CPU usage for the major photo editing operations.

Reliability

The reliability of the system is dependent on the ability of the system to prevent and recover from failures. The system should be able to prevent failures by ensuring that the system is always in a consistent state. The system should be able to recover from failures by ensuring that the system can be restored to a consistent state, such that the user does not lose any work.

Quantification

The reliability of the system is quantified by the the mean time between failures (MTBF) and the mean time to recovery (MTTR). Another metric that will be used to quantify the reliability of the system is the number of critical failures per month.

The mean time between failures is measured by the number of operations performed by the system before a failure occurs. This number is then divided by the number of failures that occured during the time period.

The mean time to recovery is measured by the number of operations required to restore the system to a consistent state after a failure has occured.

The number of critical failures per month is measured by the number of failures that occured during the month that resulted in the loss of data or the loss of the ability to perform photo editing operations.

Targets

The target mean time between failures is 100 operations.

The target mean time to recovery is 10 operations.

The target number of critical failures per month is 0.

Usability

The usability of the system is dependent on the ability of the system to be easily used by the user. It is important that the system is easy to use and that the user is able to perform the desired tasks with ease and with clearly defined steps. The system caters for all users, from novice to expert, thus it is important to note that not all users will be familiar with the system and features, thus the system must provide alternatives for these users

Quantification

To properly quantify Usability, user satisfaction cannot be neglected. Additionally the learning curve of the system must be investigated to ensure that the system is easy to use. Finally the number of user requests completed per month must be investigated to ensure that the system is able to appeal to the users.

User satisfaction is measured by the number of users that are satisfied with the system. This number is then divided by the total number of users that used the system during the time period.

The learning curve of the system is measured by the number of operations required to perform a standard photo editing operation. This number is then divided by the number of operations required to perform the same operation on a standard photo editing software.

The number of user requests completed per month is measured by the number of requests that were fulfilled during the month. This number is then divided by the total number of requests that were made by users during the month.

Targets

The target user satisfaction is 90%.

The target learning curve is 1.5 times the number of operations required to perform the same operation on a standard photo editing software.

The target number of user requests completed per month is 60%.

Security

Security is an extension of the reliability of the system. It is important that the system is able to prevent and recover from security breaches to protect user. At the same time, extensive security hampers the usability of the system, thus it is important to find a balance between security and usability to provide the best

Quantification

Security will be conceptually quantified by the integrity , confidentiality and availability of the system.

The integrity of the system is measured by the systems transparency regarding the users limitations the policies of the system.

The confidentiality of the system is measured by how secure the user's personal details are from other users. This is measured by the amount of security measures that are in place and the number of violations that have occured.

The availability of the system is measured by the amount of systems that the users are provided access to to customize and modify.

Goals

The integrity of the system must be well defined and transparent to the user.

The confidentiality of the system must be extremely well guarded and the number of violations must be 0.

The system must have a high availability such that the users must be able to customize and modify the system to their liking.

Compatibility

Compatibility is an extremely important quality requirement for the system. The system must be able to run on a variety of platforms and must be able to support a variety of image formats. Due to the nature of the system, extensive compatibility is required to ensure that the system is able to appeal to a wide range of users.

Quantification

Compatibility is quantified by the number of platforms that the system is able to run on and the number of image formats that the system is able to support.

The number of platforms that the system is able to run on is measured by the number of platforms that the system is able to run on, with a specific focus on the most popular platforms.

The number of image formats that the system is able to support is measured by the number of image formats that the system is able to support, with a specific focus on the most popular image formats.

Goals

The system should be compatible with all the most well-known platforms :

1. Windows

2. Linux

3. Mac OS

The system should be compatible with all the most well-known image file formats :

1. JPEG

2. TIFF

3. PNG

4. GIF

5. BMP