

System Specification

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Version 1
December 31, 1979

1 Version History

Version	Date	Author	Comments
1	December 31, 1979	Zwerdling	Initial version

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2 Introduction

GlyphMosaic is a graphic design program. The application facilitates a specialized graphic design workflow, in which a user supplies a source image, text, and other parameters. The application then produces a reproduction of the source image using a mosaic of textual elements from a user-supplied source.

3 System Overview

3.1 Scope

GlyphMosaic is a specialized graphic design application. It comprises the following functionality:

- Enable the user to finely specify the parameters with which the output image is generated.
- Produce the output image.

3.2 Context

The application is installed on a host system. Users interact with the system's GUI to create, load, and modify graphical mosaics.

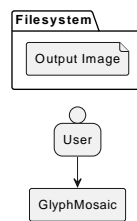


Figure 1: A hypothetical local install of GlyphMosaic and related components.

3.3 Audience

This document is intended for developers, open-source contributors, project managers, and consumers involved in the continuous development, maintenance, and use of a GlyphMosaic installation. It will provide the audience with a detailed understanding of the underlying architecture of the GlyphMosaic software application to gain better insight into how all components interact to deliver functional and robust productivity. By reading this document developers and open-source contributors can make informed decisions about how to design and implement various functionalities that will deliver an optimal user experience. This document aims to provide the audience knowledge to support decisions about identifying potential issues or areas of improvement in the system architecture. The purpose is to be a comprehensive overview of the GlyphMosaic software architecture to support all audience members involved in the development, maintenance, or usage of a GlyphMosaic application.

3.4 Statement of Purpose

GlyphMosaic is thoroughly described in this architectural document. Diagrams are also supplied to make it easier to comprehend the internal workings of the system. Various aspects of the GlyphMosaic architecture, including its core elements, modules, and code structure, are described. Functionality and quality attributes are described. The investigation has shown that the GlyphMosaic architecture offers several advantages, including a modular design, flexibility, and usability that have helped it become so popular. Nevertheless, the investigation has also pointed out other flaws that may be strengthened to improve the application's overall performance, such as its heavy reliance on

plugins and the possible security risks they provide. This document should act as a reference for any person interested in better understanding the GlyphMosaic architecture.

This report attempts to accomplish the following goals:

- Describe the complete architecture of the system.
- Describe available process alternative methods and their trade-offs.
- Provide a broad statement of use for the system itself.

4 Glossary

- **Bitmap**
- **Document**
- **Glyph**
- **Graphical User Interface**
- **Output Image**
- **Source Image**
- **Source Text**
- **Region**
- **Region Line Kernel**

5 Stakeholders

5.1 Stakeholders

- **Output Image consumers**
Individuals who view or request graphic design produced by the system.
- **Developers**
Individuals responsible for producing the system as described in this document.
- **Graphic Designers**
Individuals who produce graphic designs using the system.

6 Requirements

Requirements for GlyphMosaic aim to create a responsive and productive environment for its users. The GlyphMosaic System provides a specialized method to build unique graphic mosaic designs.

6.1 Functionality

GlyphMosaic’s main built-in functionality is focused entirely on the workflow of creating mosaics. In the most common workflow, a user will load source image and source text into the program, adjust various settings and bitmaps to their needs, render a high-resolution version of the output mosaic, and then save that file for use outside the application.

6.2 Differentiation

Existing systems perform a similar, but limited subset, of functionality of the system. Textaizer[?], for example, has the ability to specify various line patterns, such as spirals. Many other examples exist that focus solely on LTR horizontal mosaics.

GlyphMosaic does not have these limitations. The creator is able to specify the glyph line pattern by specifying a region line kernel for each region. The system then determines a text path which encompasses the entire region, and develops a

6.3 Use Cases

- **System Installation**

- ◆ Users should be able to download, install, and run the system on their own devices.

- **Content Creation**

- ◆ Users should be able to create and modify GM documents.

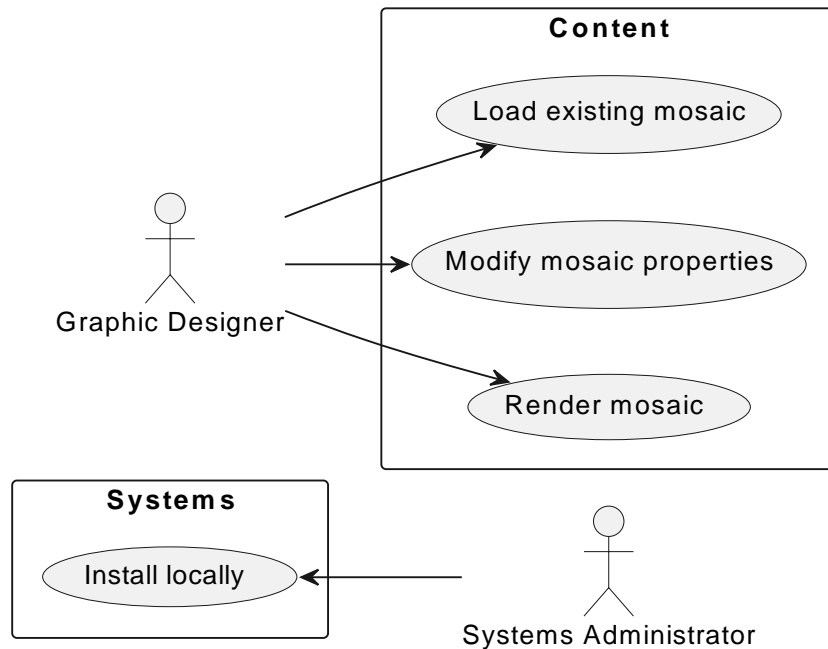


Figure 2: GlyphMosaic supports a specialized graphic design workflow.

7 System Qualities

7.1 Performance

Users should be able to rapidly receive feedback representing the current state of the project. This includes a preview of the document they wish to create.

- **Tactics**

- ◆ **Cacheing**

Throughout the image creation pipeline, certain modules may not necessarily produce different output, given a user's input. Recomputing these results is wasteful, and avoided by implementing a cacheing layer available to other modules in the system. This method involves trading future computational load for memory space.

- ◆ **Profiling**

Architects of the system utilize system profiling on typified workloads to determine bottlenecks in performance. These bottlenecks are then examined and the system is revised to eliminate it.

- **Scenarios**

- ◆ **Region Drawing**

When a user draws a region mask on the preview pane, the system should display a preview of the mask within one tenth of a second.

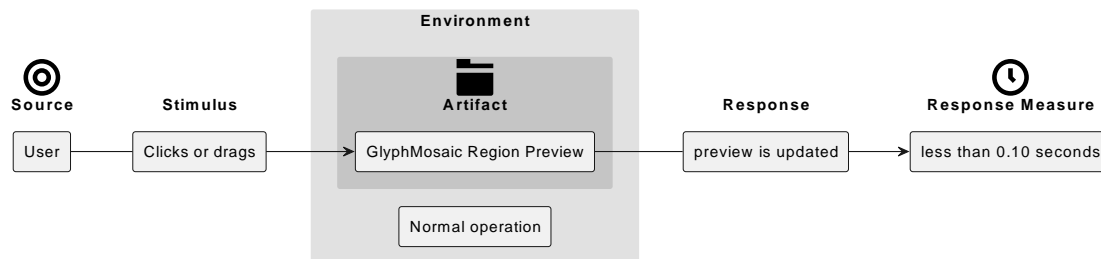


Figure 3: GlyphMosaic gives near-instantaneous feedback for region specification.

- ◆ **Mosaic Preview “Cold” Response**

When a user opens the preview pane, it should display a preview of the mosaic within one second.

- ◆ **Mosaic Preview “Warm” Response**

When a user changes a parameter in the document while the preview pane is already open and viewing a result of that change, the user should see the result of that change within one quarter of one second.

- ◆ **Mosaic Full Render Response**

When the user triggers a full render of the document, the system should write the result to the host filesystem within 20 seconds.

8 Architectural Views

8.1 Components & Connectors

The system interacts with the following aspects of the host system:

- **Filesystem**

The system retrieves source images and text from the local filesystem.

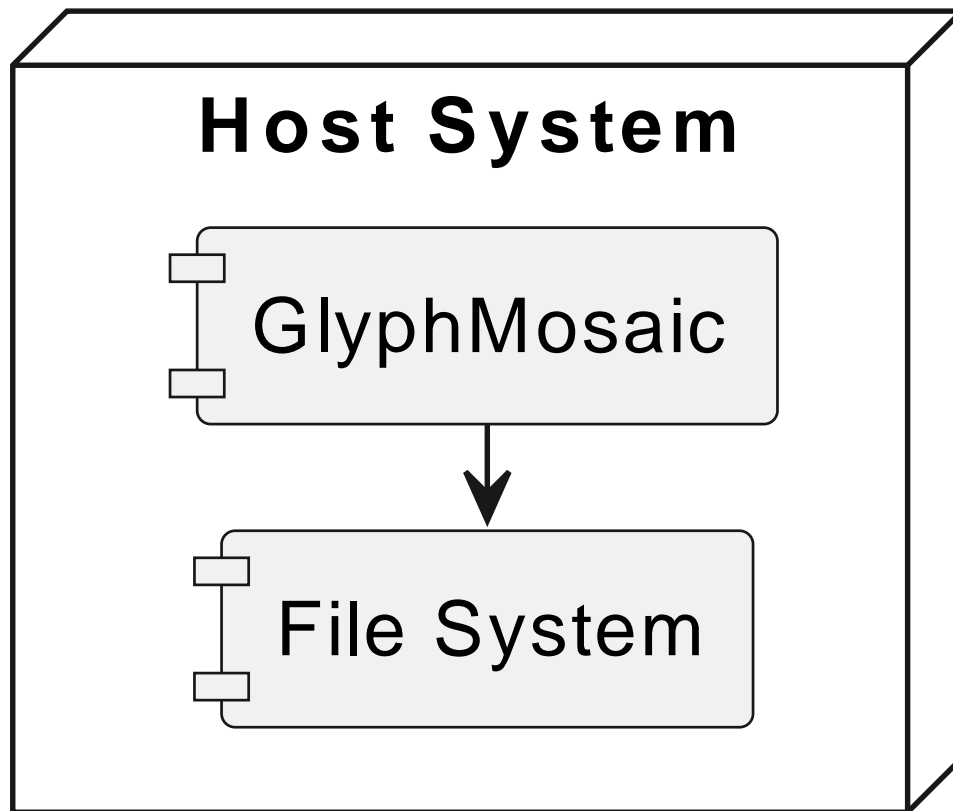


Figure 4: The GlyphMosaic system is fairly limited in responsibility from an application/systems administrator perspective.

8.2 Modules

9 Architecture

9.1 Drivers

- Design Purposes

- ♦ Modeling a Specialized Workflow

The system is designed to facilitate a specific graphic design workflow. This workflow follows an interactive approach, like most graphic design workflows, in which a document would be created and modified in successive phases until the designer is content with the result. At this point, the designer indicates to the system that the image should be rendered at high-resolution for output and consumption by other systems.

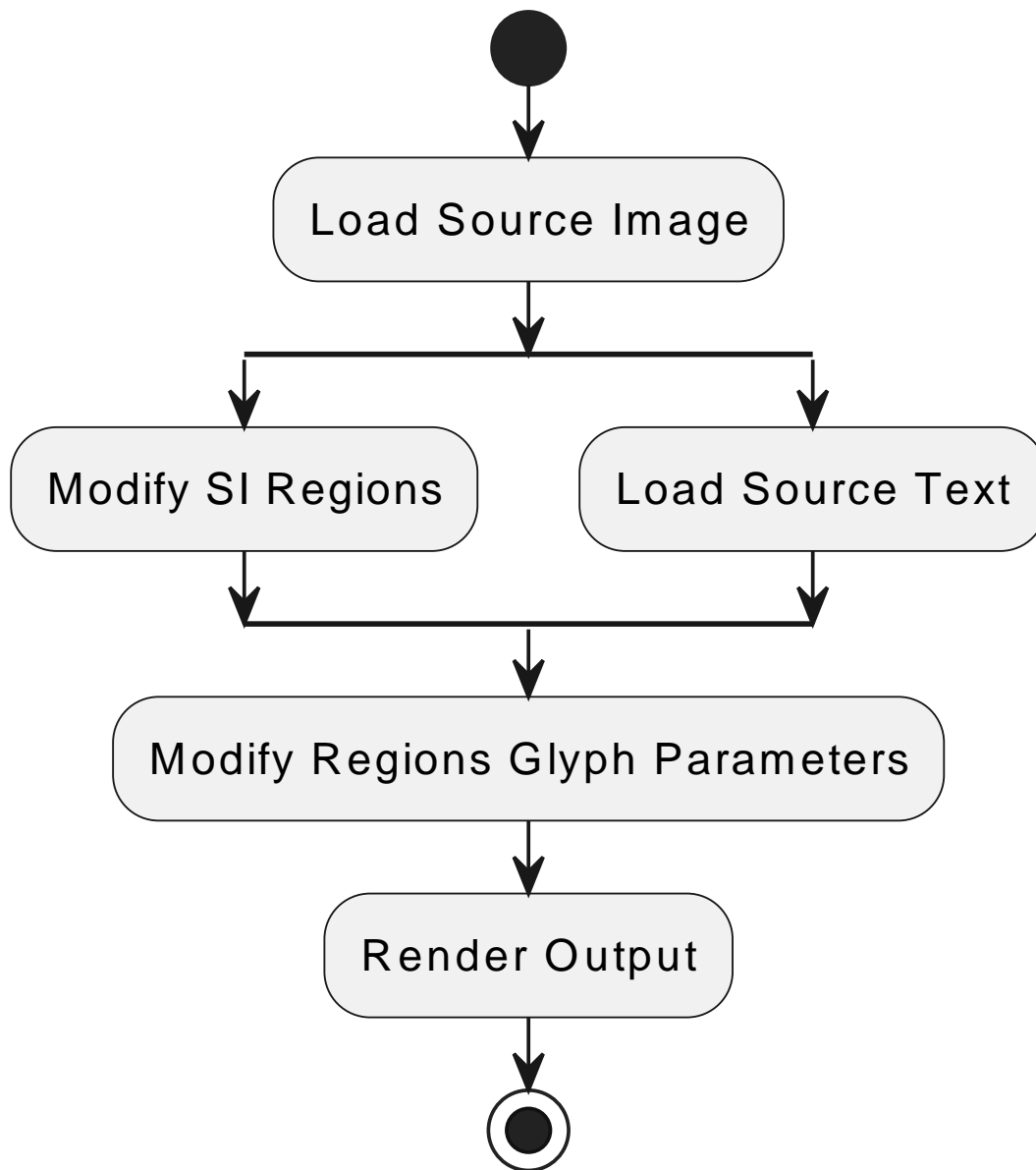


Figure 5: The system workflow includes specialized phases.

- **Use Cases**
See Section 6.3
- **Quality Attributes**
See Section 7
- **Constraints**
 - ♦ **Resource Use Limitations**
Devices serving GlyphMosaic may be constrained by processing power and memory.

9.2 Styles and Patterns

GlyphMosaic communicates with the host operating system using standard methods.

Monolithic Within the host operating system, the process exists within a singular executable. This simplifies potential complexity

Layered Within the monolithic system, subsystems compose into macroscopic functionality as layers. This method of design is an attempt to mitigate complexity of the system. This approach is utilized in the following locations:

- **Test**
Description.

Pipe/Filter In many cases, systems are composed in series to build larger functionality. This approach is utilized in the following locations:

- **Test**
Description.

Model-View-Controller This approach is utilized in the following locations:

- **Test**
Description.

Event Bus

This approach is utilized in the following locations:

- **Test**
Description.

9.3 Rationales

A few of the most enabled qualities include:

- **Performance**
- **Maintainability**

9.4 Alternative Architectures

- **Distributed Computing**
Breaking up components of GlyphMosaic into services could enable more computational resources to be added to the system.

9.5 Challenges and Limitations

9.5.1 Performance