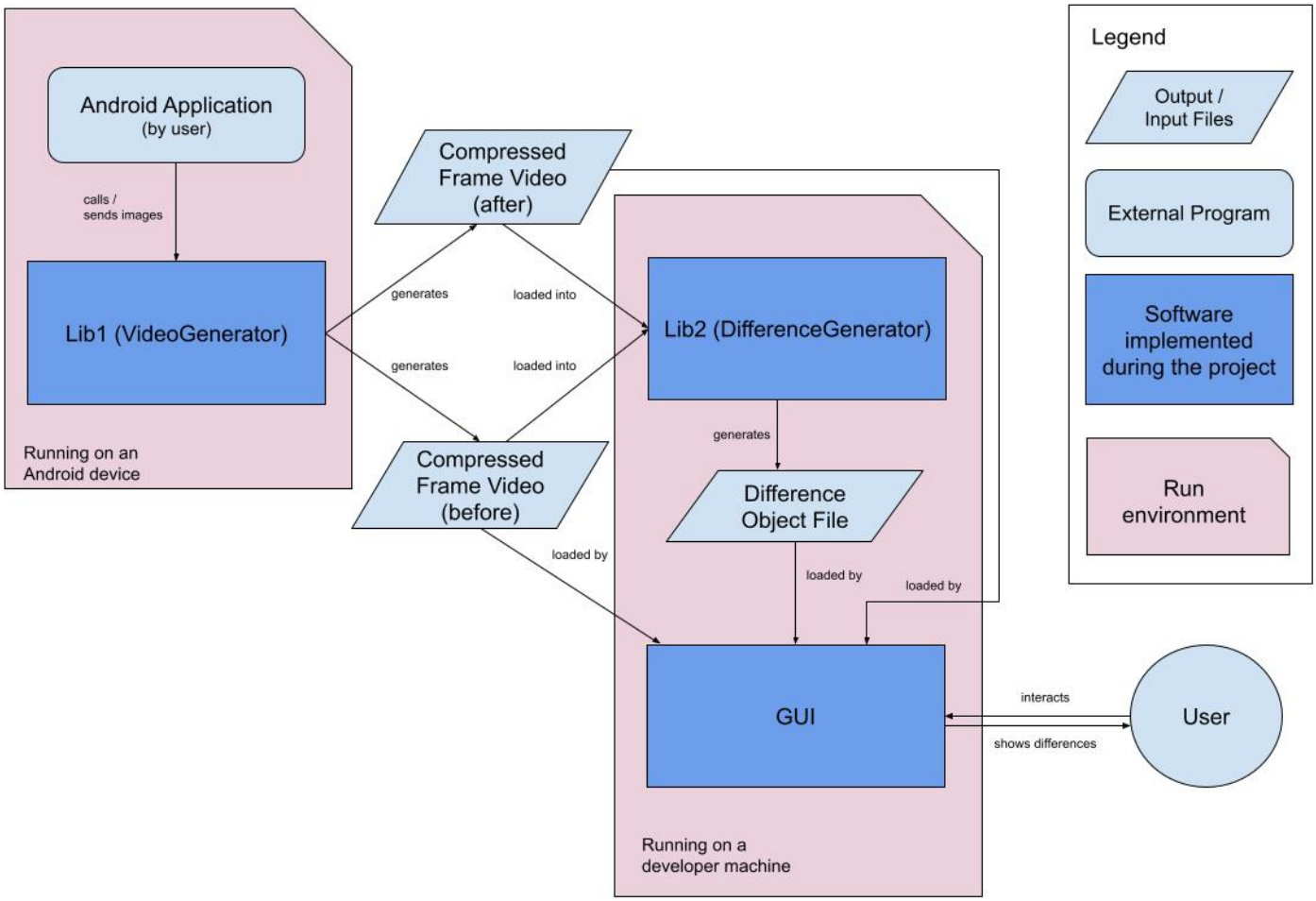
Runtime Components

The software is comprised of three main components:

- **VideoGenerator Library:**
  - Saves sequences of images as compressed video files.
  - Usable by both Android and desktop applications.
- **DifferenceGenerator Library:**
  - Compares video files to find differences between frames.
  - Utilizes an AlignmentAlgorithm for sequence alignment.
  - Supports masking to exclude irrelevant content.
- **Graphical User Interface (GUI):**
  - Allows users to load two video files.
  - Uses the DifferenceGenerator library to display matching images, differences, and added/deleted frames.



For interoperability, all subprojects are written in `Kotlin` and built with `Gradle`.

DifferenceGenerator Library

The DifferenceGenerator library exposes the `DifferenceGenerator` class, taking an `AlignmentAlgorithm` object, two input video file paths, an output file path, and an optional mask file path.

Masking

A mask is an image applied to a frame to mask out parts deemed irrelevant for generating differences.

Alignment

Assumptions about input videos:

- Images can occur multiple times.
- Images stay in the same order if included in both videos.
- Similarity of two images computed by differing pixels.
- An image can be added/deleted.
- Many frames will be exactly the same in both videos.

Sequence alignment algorithms, extending the `AlignmentAlgorithm` interface, are used. Two approaches:

- **Gotoh Algorithm:** Global alignments, penalizing longer insertions/deletions less.
- **Divide and Conquer Approach:** Linear time complexity, leveraging exact matches as anchors.

Output

After computing the alignment sequence, an output video is generated with color coding:

- **Match:** Black pixels for matching, red for differing.
- **Insertion:** All pixels are green.
- **Deletion:** All pixels are blue.

The GUI can also access the alignment produced by the DifferenceGenerator directly.