Understand the Java Parallel Image StreamGang Structure & Functionality

Douglas C. Schmidt

d.schmidt@vanderbilt.edu

www.dre.vanderbilt.edu/~schmidt

Professor of Computer Science

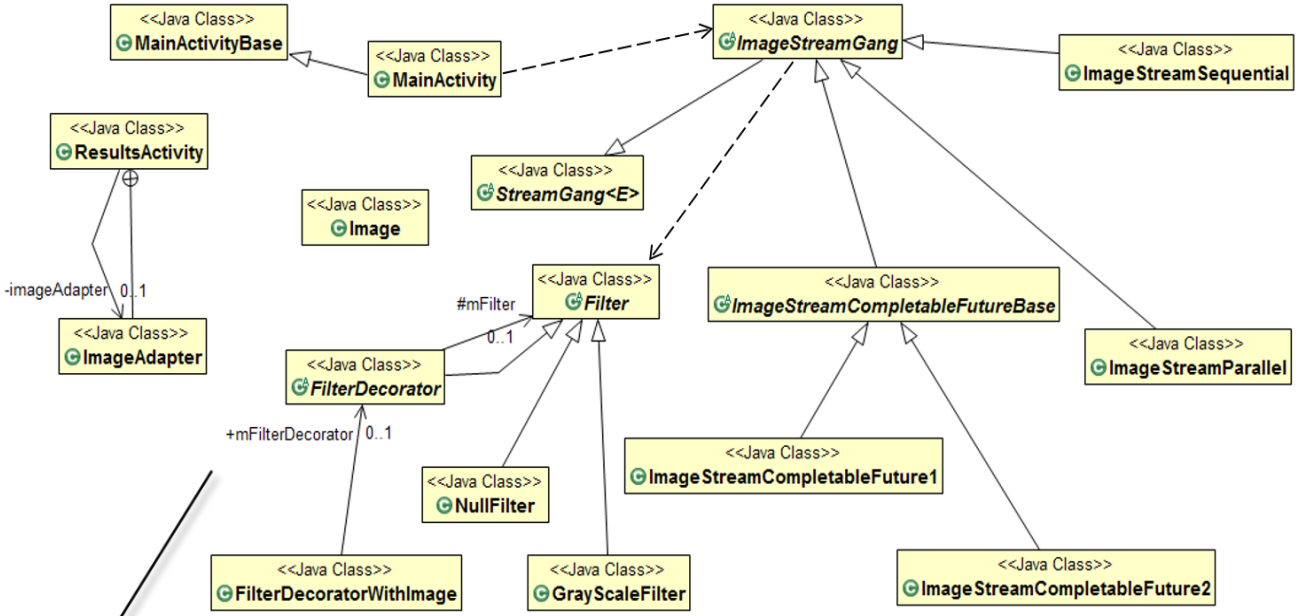
Institute for Software Integrated Systems

Vanderbilt University

Nashville, Tennessee, USA

Learning Objectives in this Part of the Lesson

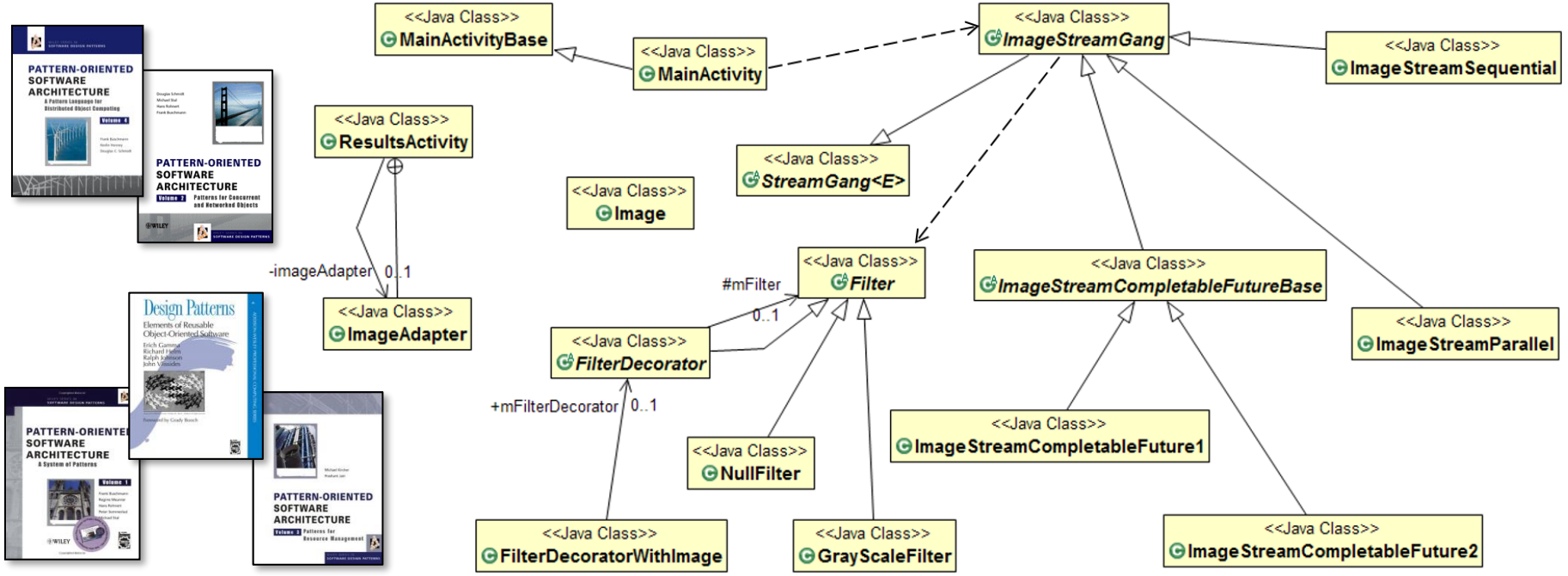
- Understand the structure & functionality of the ImageStreamGang app
  - It applies several Java parallelism frameworks
  - Focus is on integrating object-oriented & functional programming paradigms



This design shows the synergy between object-oriented & functional programming

Learning Objectives in this Part of the Lesson

- Understand the structure & functionality of the ImageStreamGang app
  - It applies several Java parallelism frameworks
  - Focus is on integrating object-oriented & functional programming paradigms

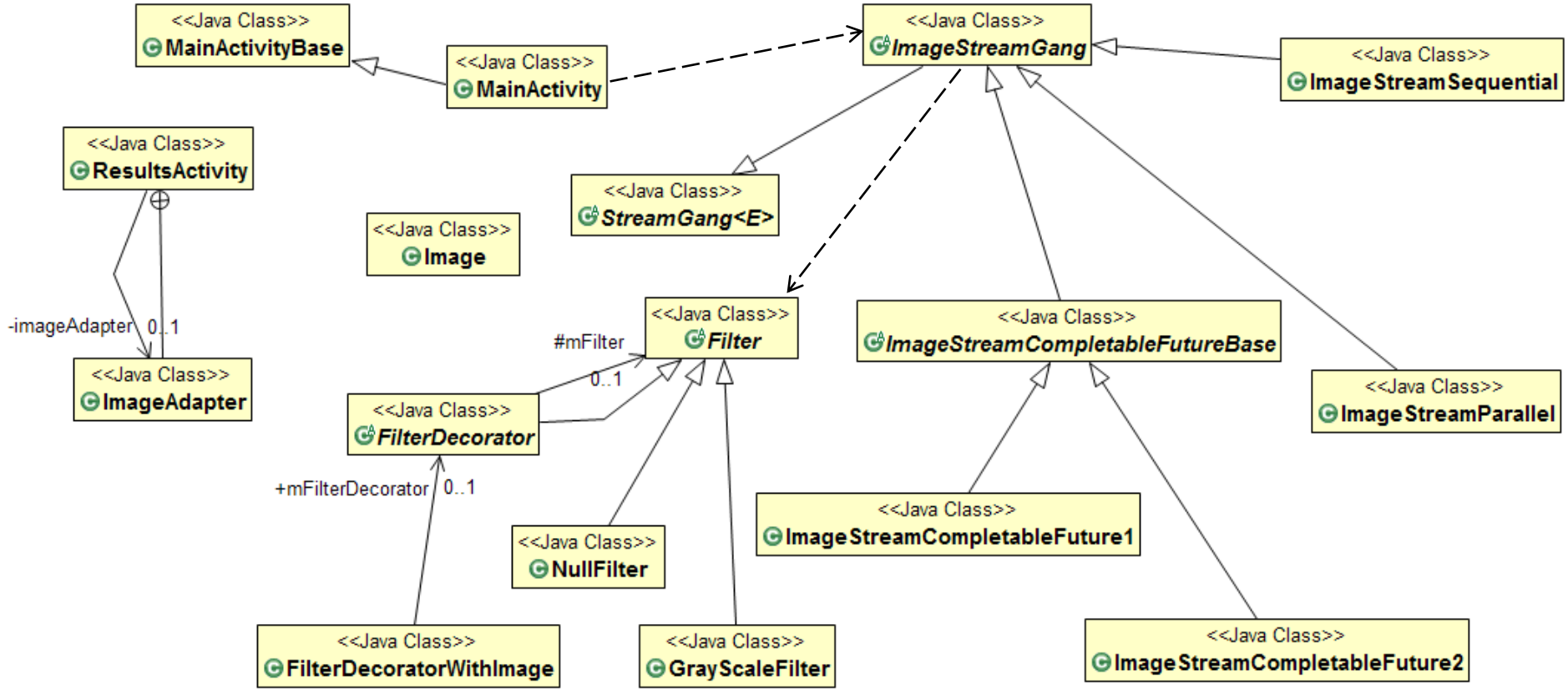


Patterns are used to emphasize key roles & responsibilities in the app's design

The Structure of the ImageStreamGang App

The Structure of the ImageStreamGang App

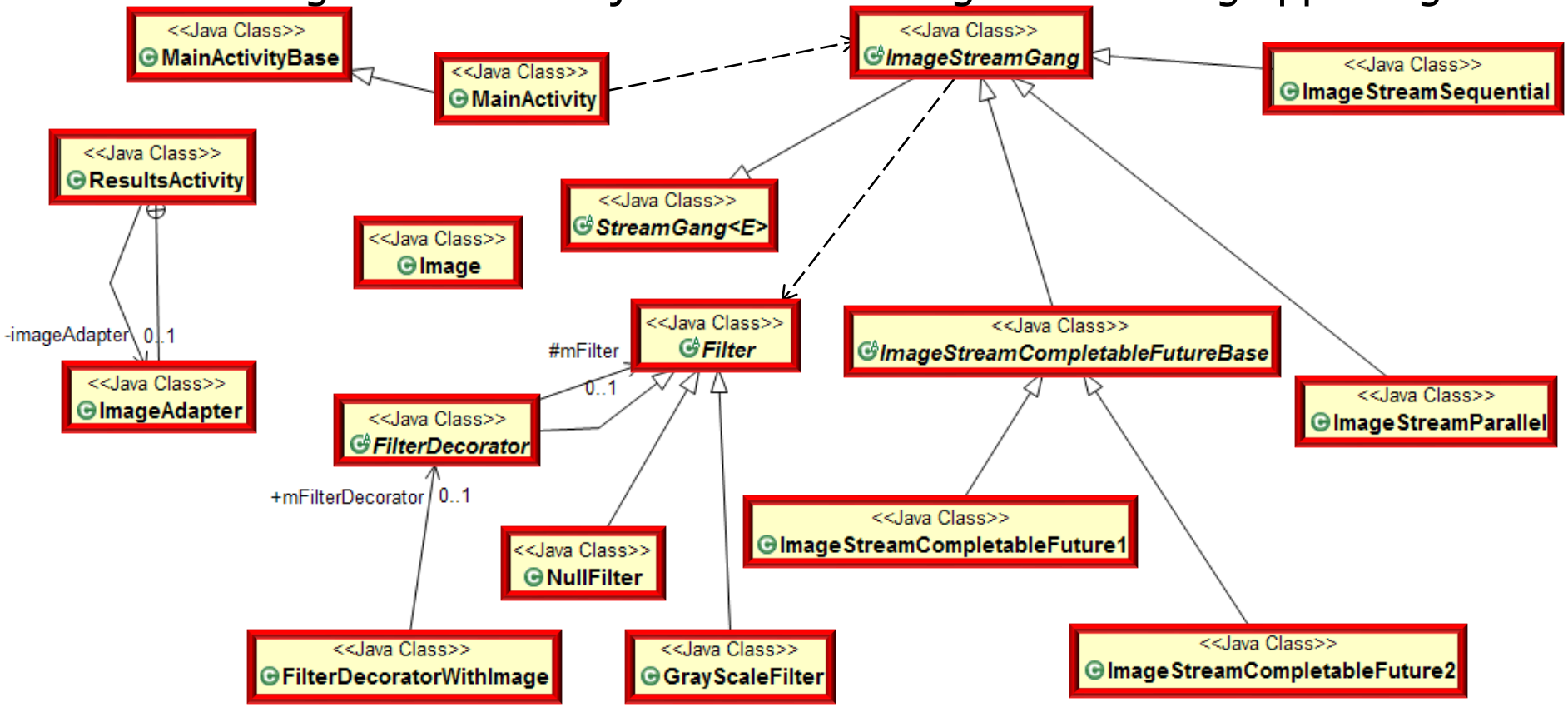
- UML class diagram for the object-oriented ImageStreamGang app design



See en.wikipedia.org/wiki/Unified_Modeling_Language

The Structure of the ImageStreamGang App

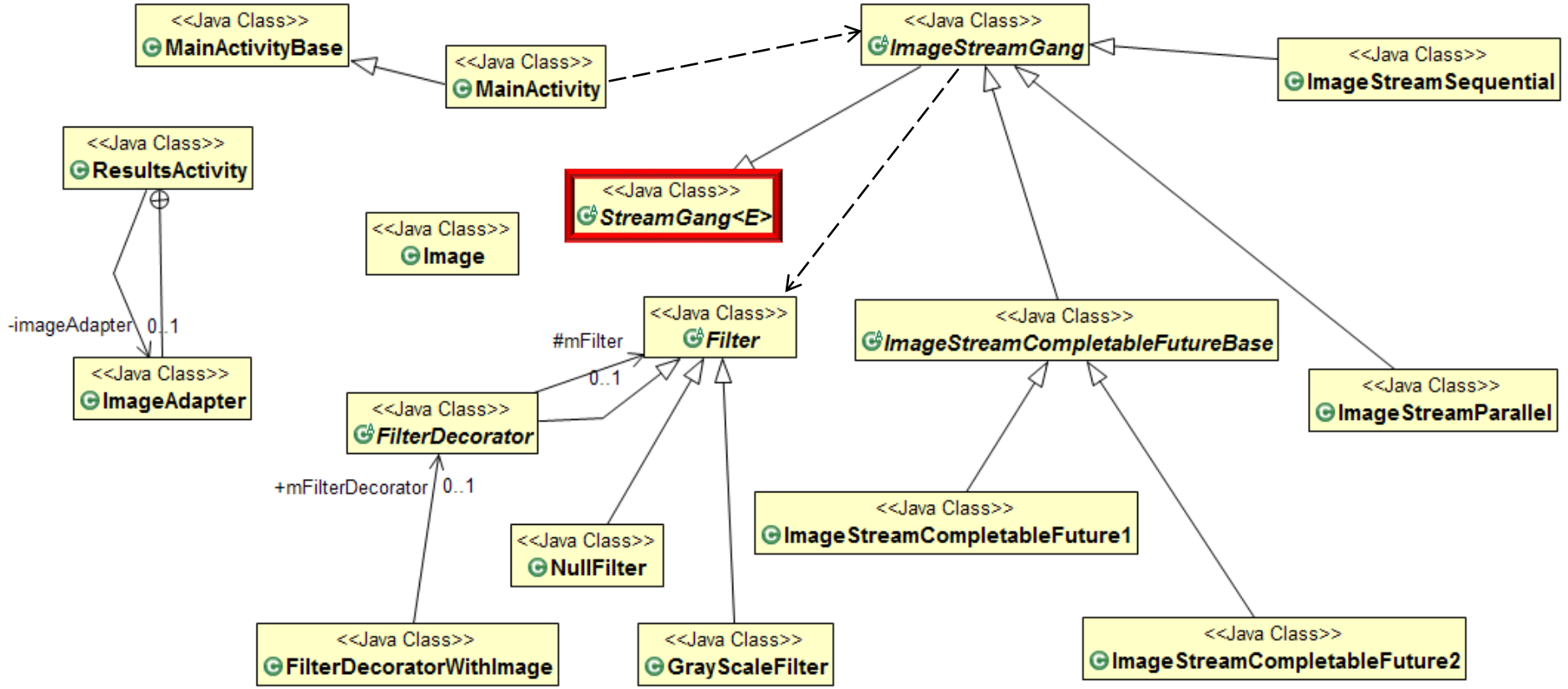
- UML class diagram for the object-oriented ImageStreamGang app design



These classes apply Java features to image downloading & processing

The Structure of the ImageStreamGang App

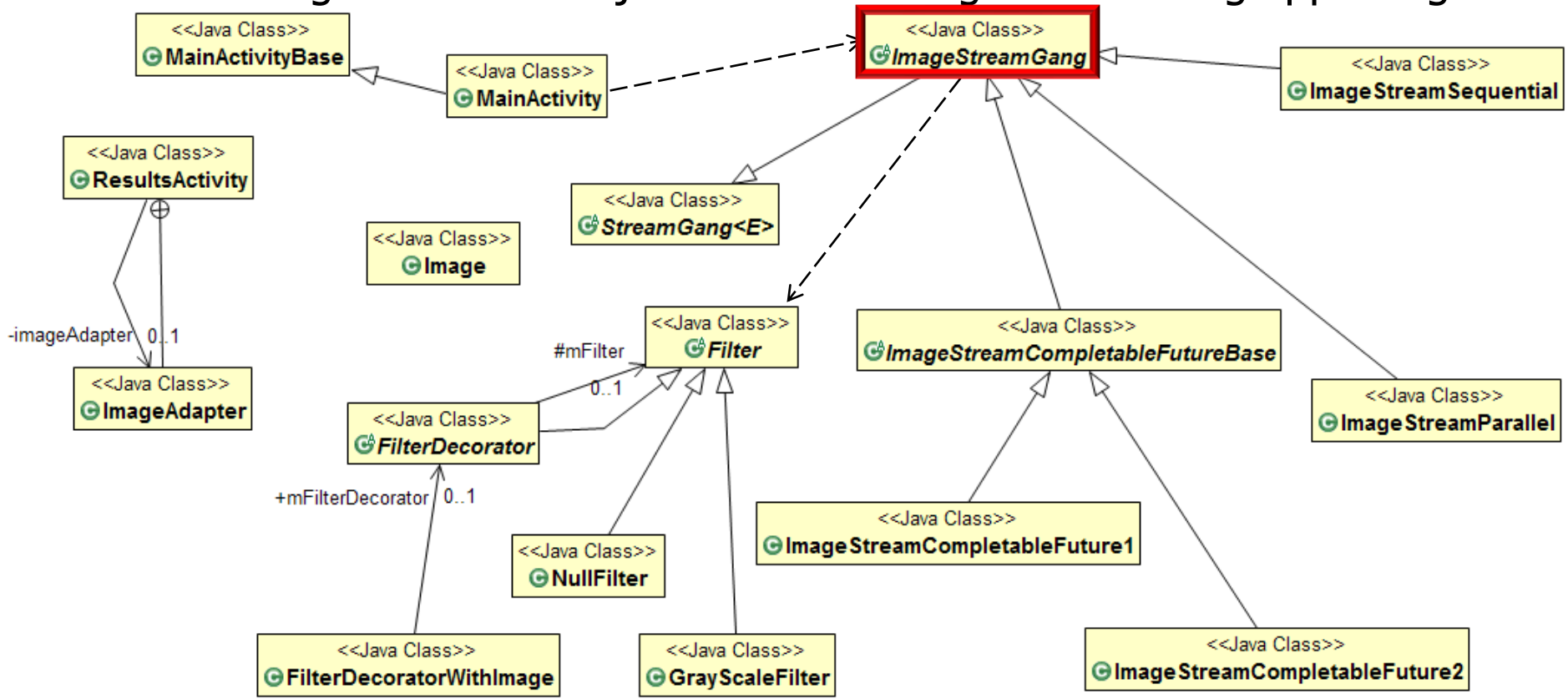
- UML class diagram for the object-oriented ImageStreamGang app design



A framework for initiating streams that process input from a list of elements

The Structure of the ImageStreamGang App

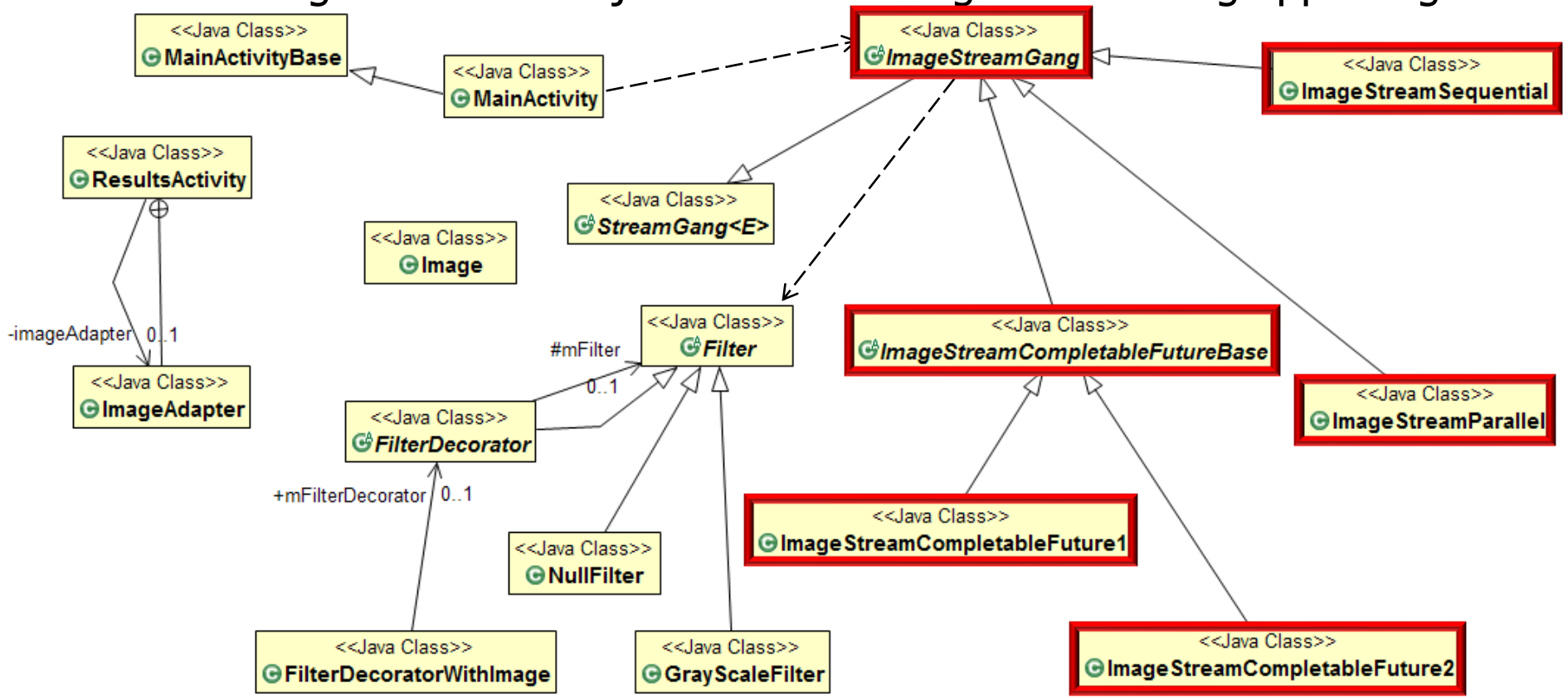
- UML class diagram for the object-oriented ImageStreamGang app design



Customizes the StreamGang framework to download & process images ...

The Structure of the ImageStreamGang App

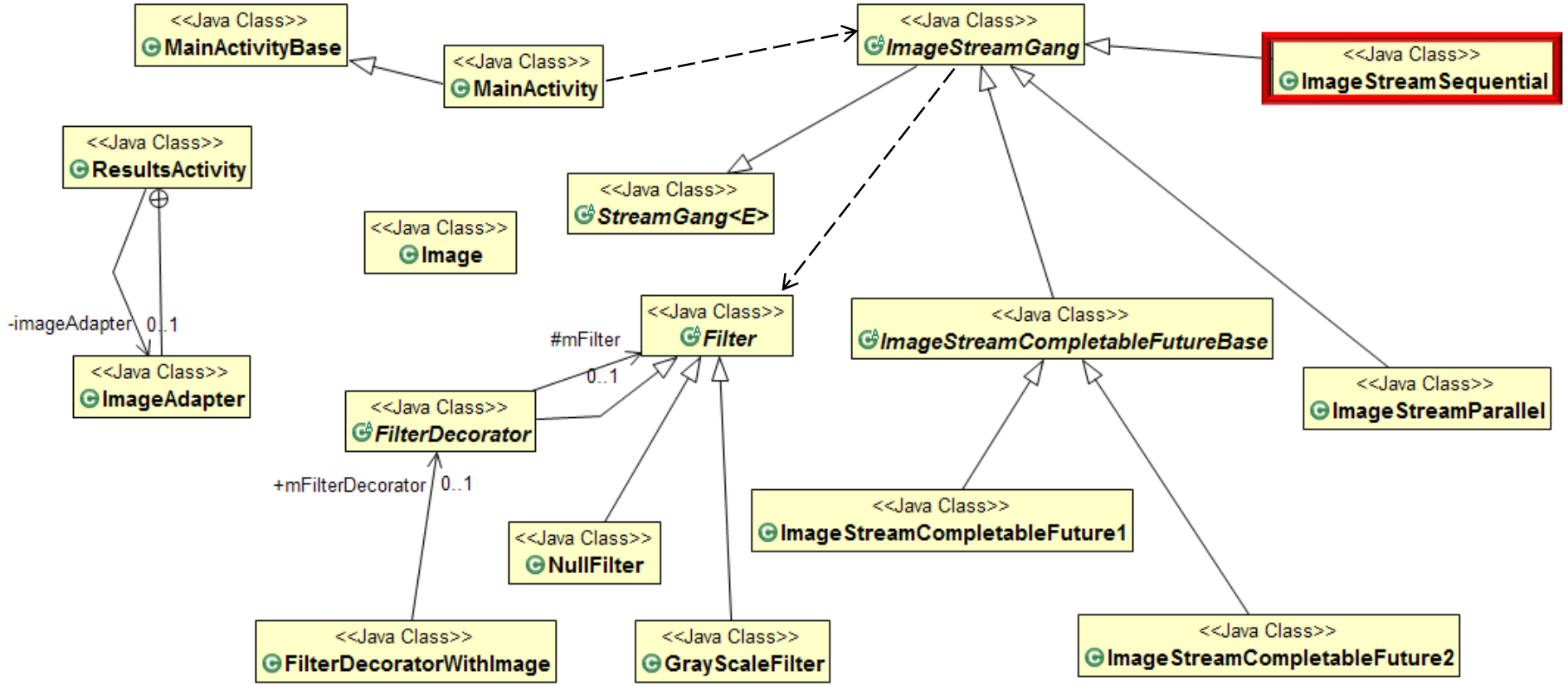
- UML class diagram for the object-oriented ImageStreamGang app design



... based on different Java concurrency & parallelism frameworks

The Structure of the ImageStreamGang App

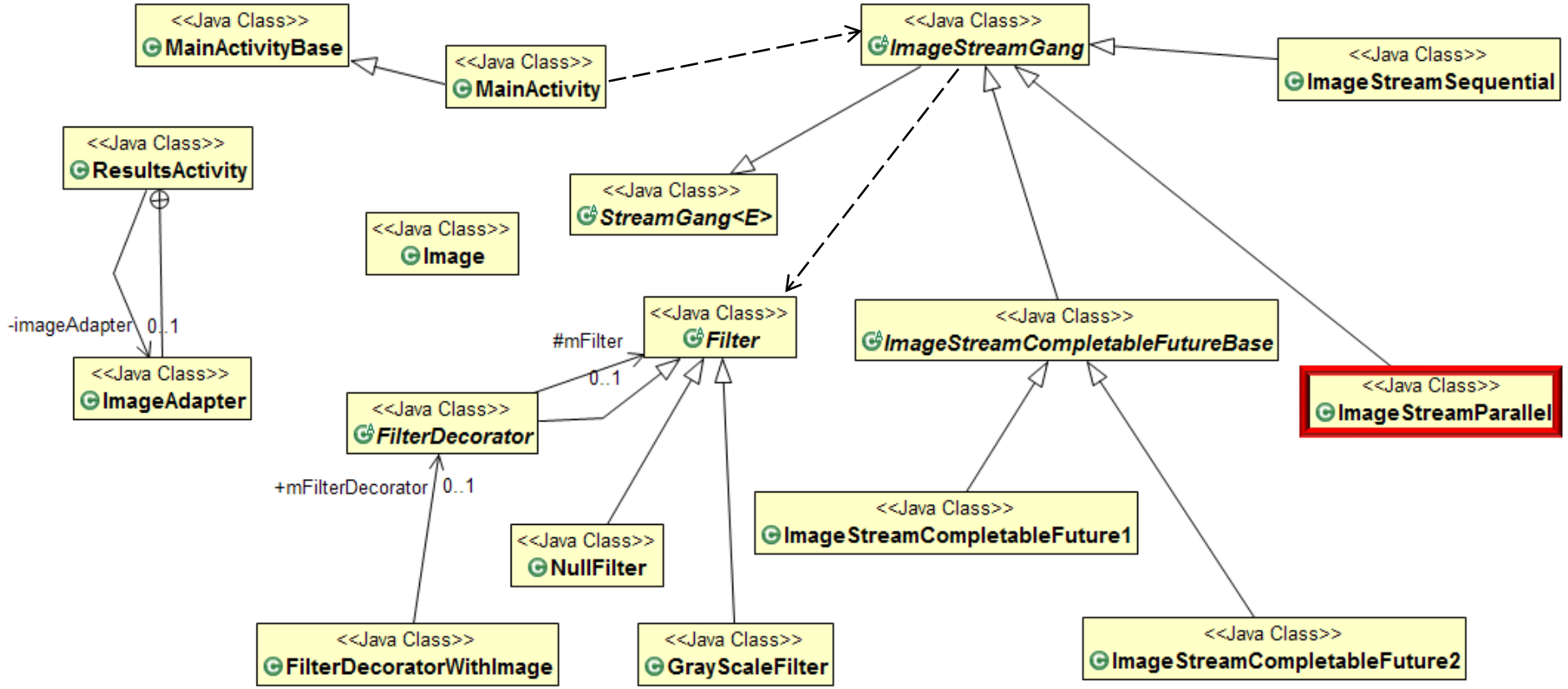
- UML class diagram for the object-oriented ImageStreamGang app design



Uses Java streams to download & filter images sequentially

The Structure of the ImageStreamGang App

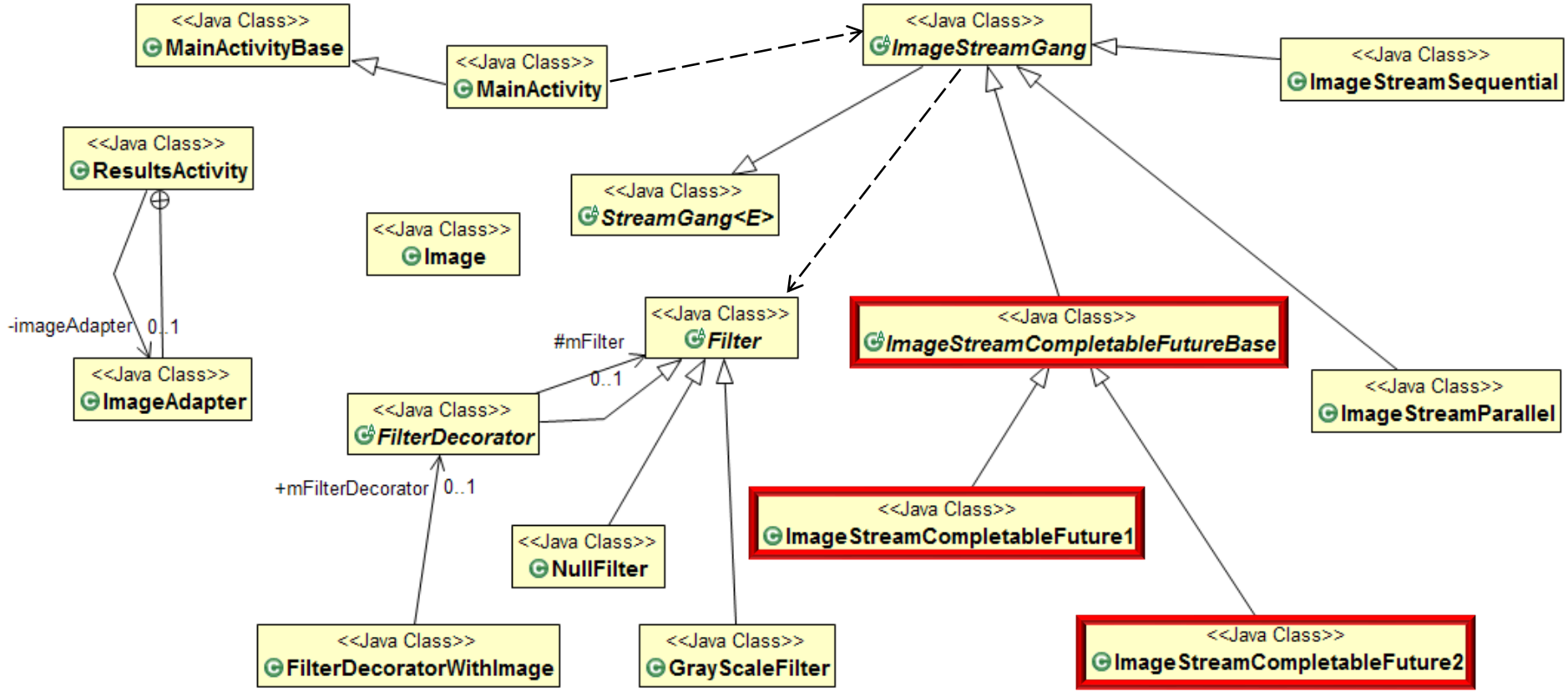
- UML class diagram for the object-oriented ImageStreamGang app design



Uses Java parallel streams to download & filter images concurrently

The Structure of the ImageStreamGang App

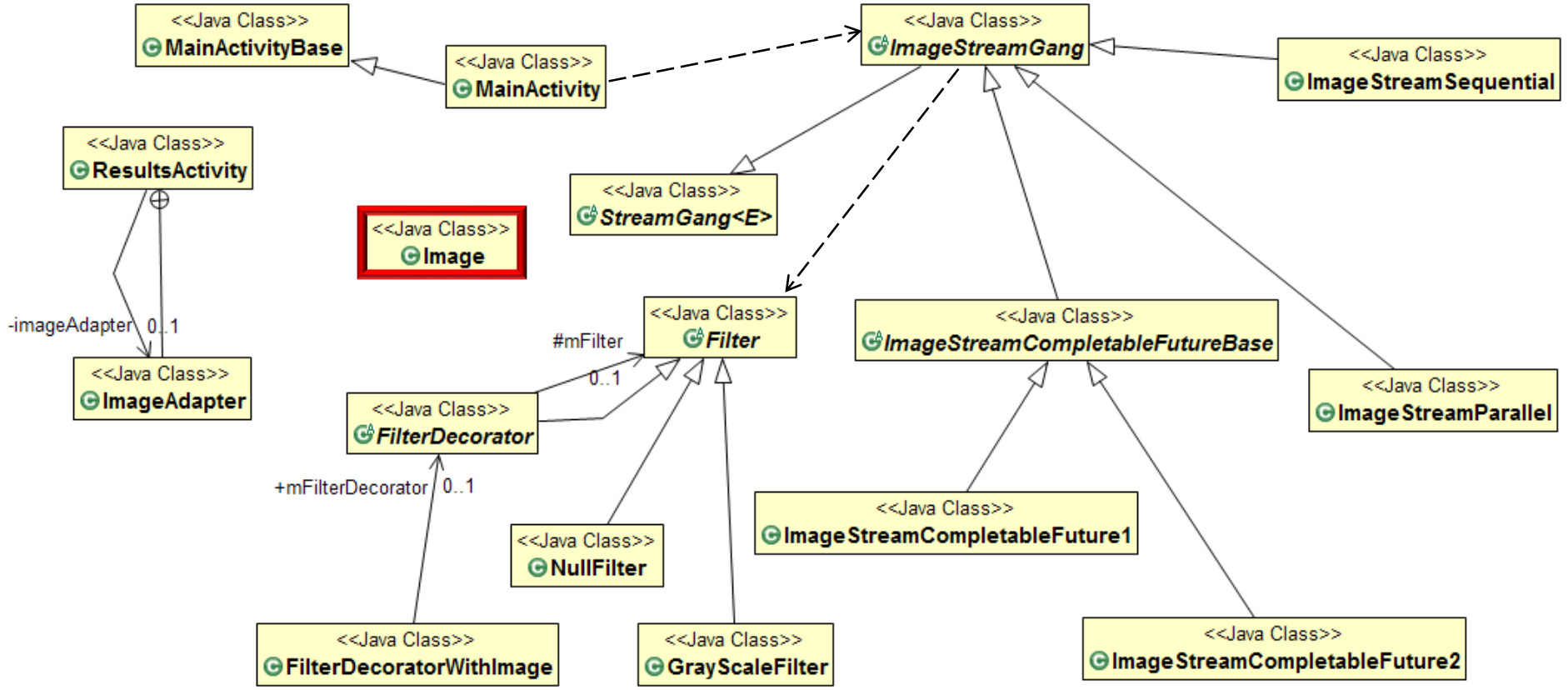
- UML class diagram for the object-oriented ImageStreamGang app design



Uses Java CompletableFutures to download & filter images asynchronously

The Structure of the ImageStreamGang App

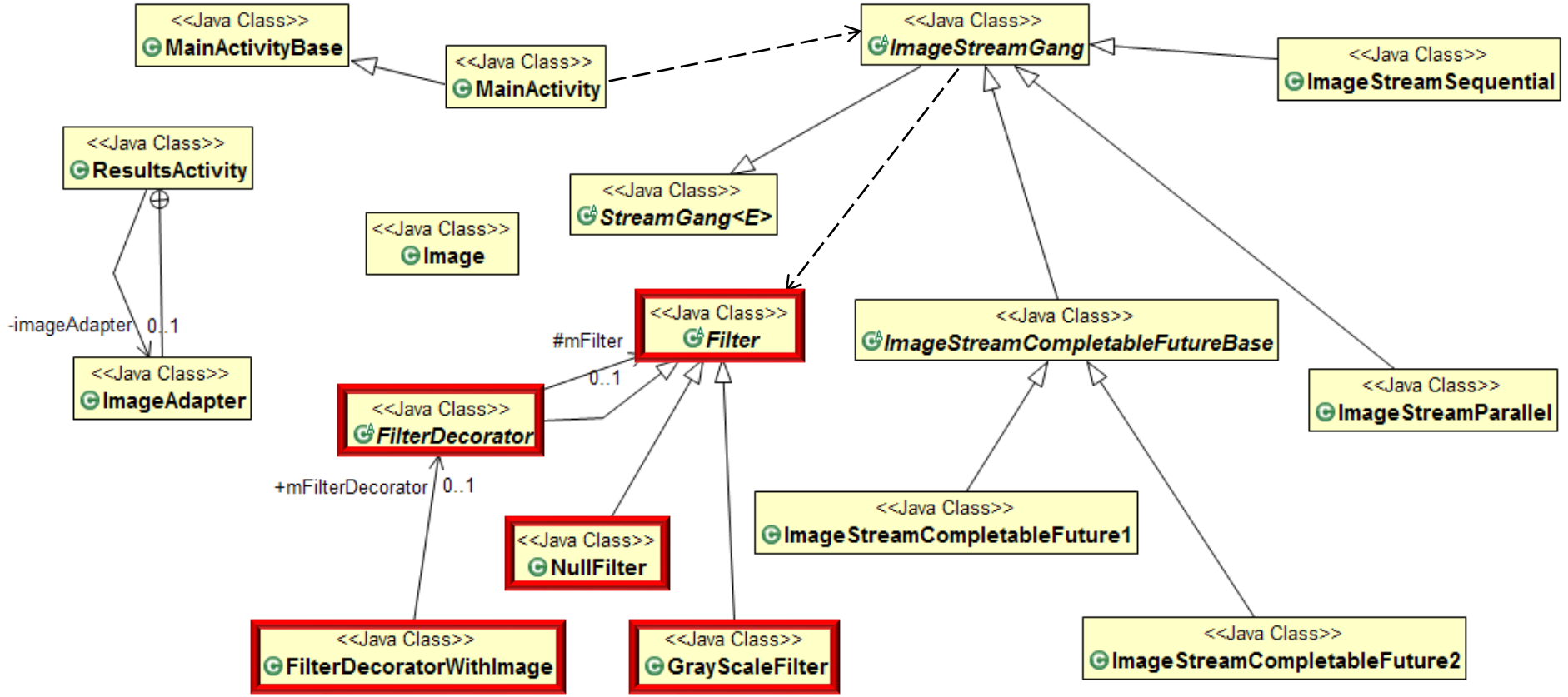
- UML class diagram for the object-oriented ImageStreamGang app design



Stores image meta-data & provides methods for common image-/file-related tasks

The Structure of the ImageStreamGang App

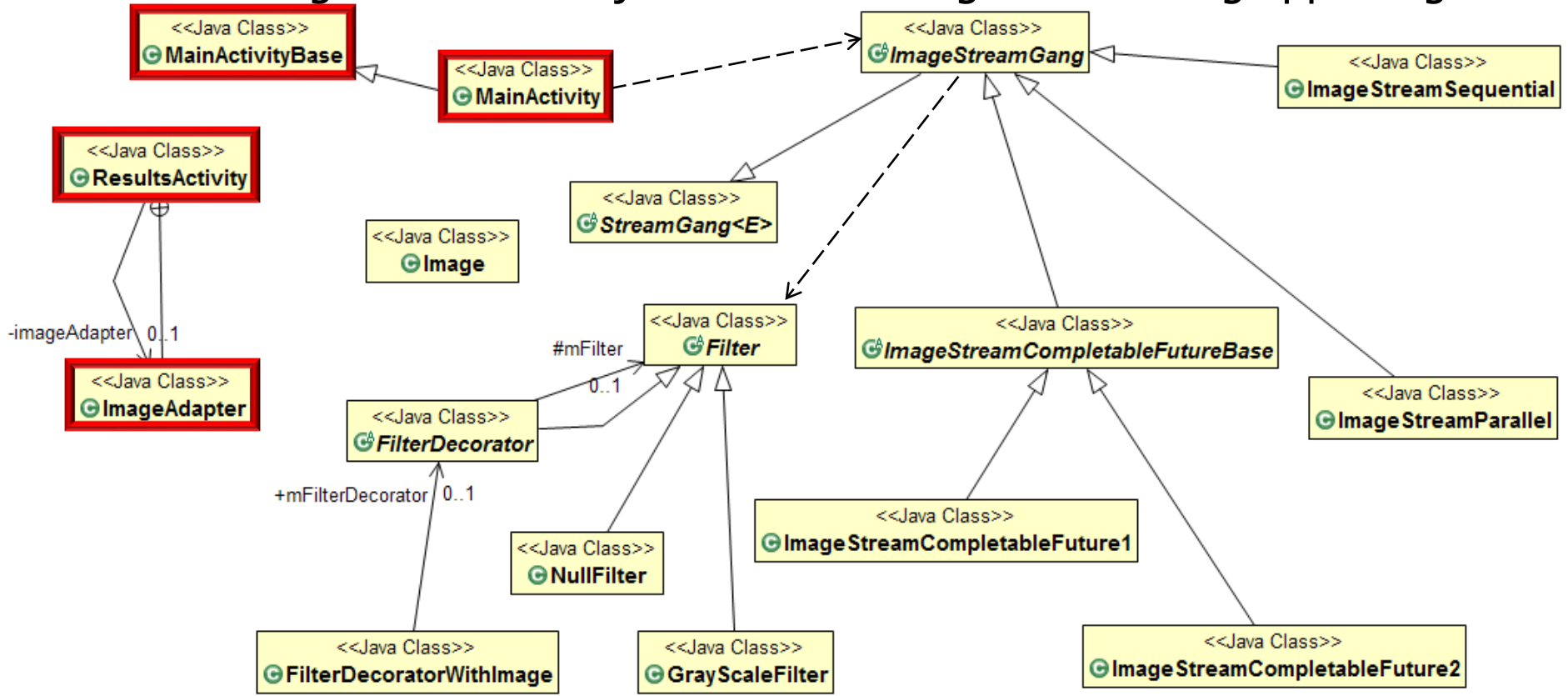
- UML class diagram for the object-oriented ImageStreamGang app design



This class hierarchy applies operations to filter & store images

The Structure of the ImageStreamGang App

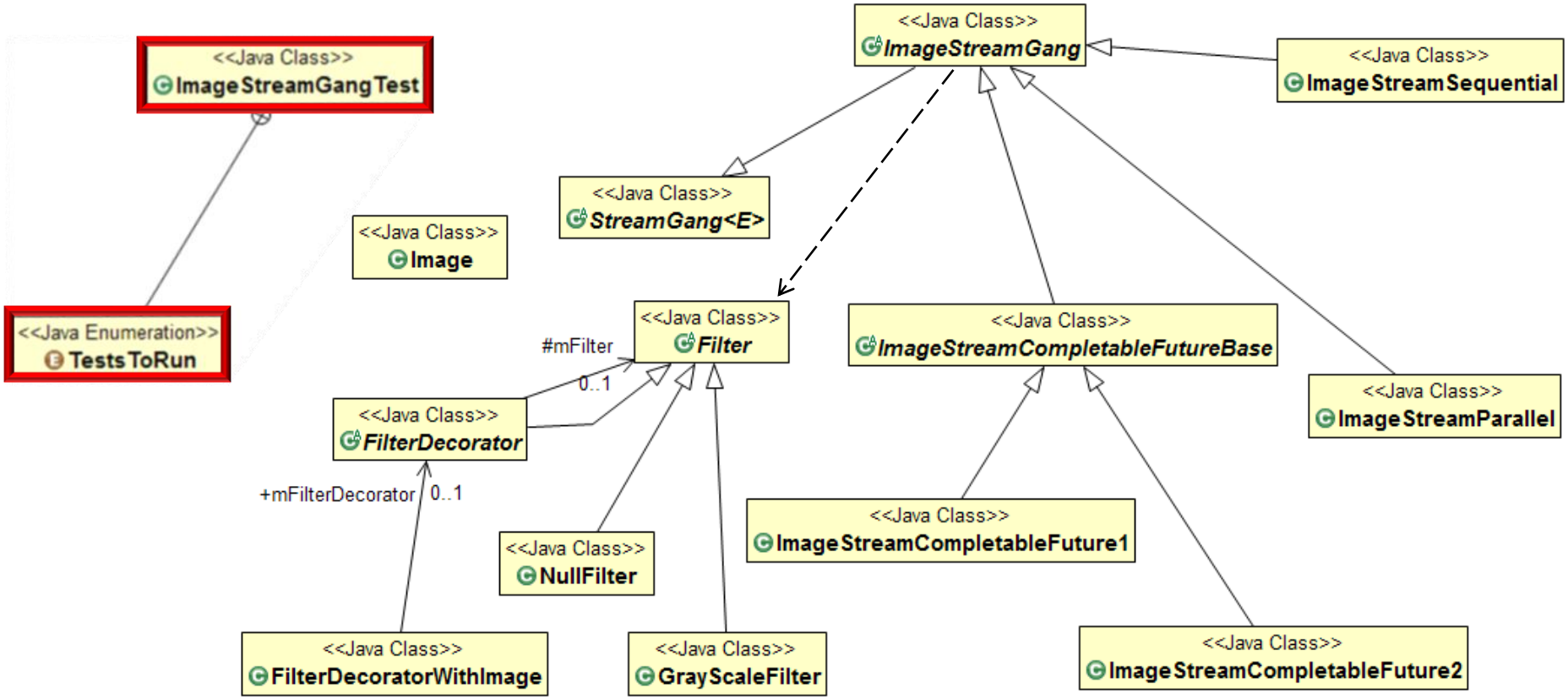
- UML class diagram for the object-oriented ImageStreamGang app design



Provides the user interface for an Android app

The Structure of the ImageStreamGang App

- UML class diagram for the object-oriented ImageStreamGang app design



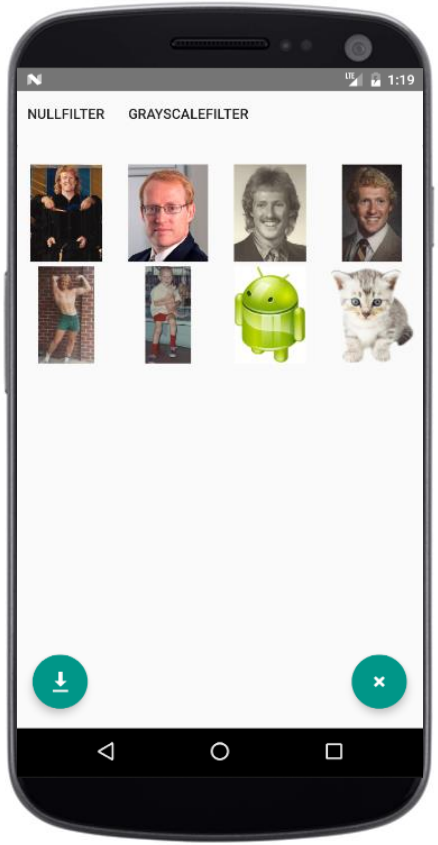
There's a Java console version of ImageStreamGang that shares most of the code

Running the Image StreamGang App

Running the ImageStreamGang App

Starting ImageStreamGangTest
Printing 4 results for input file 1 from fastest to slowest
COMPLETABLE_FUTURES_1 executed in 312 msecs
COMPLETABLE_FUTURES_2 executed in 335 msecs
PARALLEL_STREAM executed in 428 msecs
SEQUENTIAL_STREAM executed in 981 msecs

Printing 4 results for input file 2 from fastest to slowest
COMPLETABLE_FUTURES_2 executed in 82 msecs
COMPLETABLE_FUTURES_1 executed in 83 msecs
PARALLEL_STREAM executed in 102 msecs
SEQUENTIAL_STREAM executed in 251 msecs
Ending ImageStreamGangTest



Tests conducted on a 2.6 GHz six-core Lenovo P52 with 64 Gbytes of RAM

End of Understand the Java Parallel ImageStreamGang Structure & Functionality