

# Case Study: ExoPlayer

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# Outline

- ❖ What is ExoPlayer
- ❖ Quality Attributes
- ❖ Design Pattern 1
- ❖ Design Pattern 2
- ❖ Design Pattern 3
- ❖ Design Pattern 4

# What is ExoPlayer

- ❖ ExoPlayer is an application level **media player for Android**.
- ❖ It provides an alternative to Android's MediaPlayer API for **playing audio and video both locally and over the Internet**.
- ❖ ExoPlayer supports features not currently supported by Android's MediaPlayer API, **including DASH and SmoothStreaming adaptive playbacks**.
- ❖ ExoPlayer is **easy to customize and extend**, and can be updated through Play Store application updates.

Source: <https://exoplayer.dev/>

# Quality Attributes

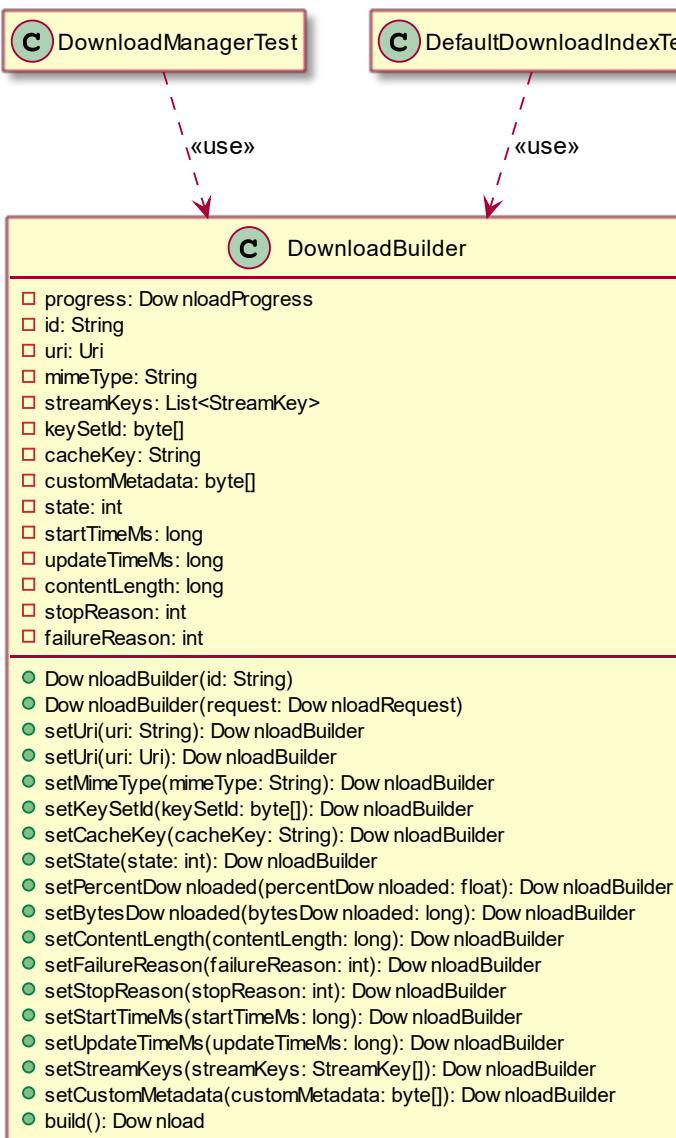
- ❖ Interoperability
  - ❖ “Support for DASH and SmoothStreaming. Many other formats are also supported.”
- ❖ Modifiability
  - ❖ “The ability to customize and extend the player to suit your use case.”
- ❖ Usability
  - ❖ “Support for playlists.”
- ❖ Weakness: Performance
  - ❖ “For audio only playback on some devices, ExoPlayer may consume significantly more battery than MediaPlayer.”

Source: <https://exoplayer.dev/pros-and-cons.html>

# ExoPlayer: Design Patterns

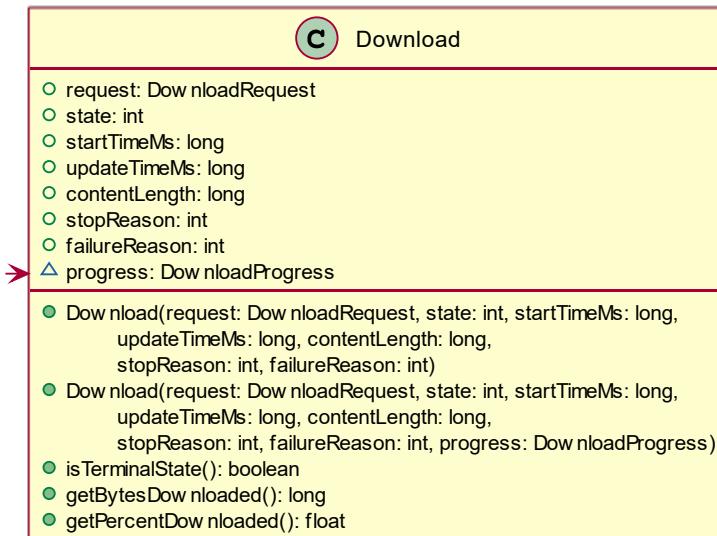
# Builder Pattern

- ❖ <https://github.com/google/ExoPlayer/blob/r2.17.1/testutils/src/main/java/com/google/android/exoplayer2/testutil/DownloadBuilder.java>
- ❖ DownloadBuilder acts as a builder
- ❖ Line 109 to 197: methods for setting various parameters and returning the object itself (this)
- ❖ Line 199 to 217: build method returns an instance of Download
- ❖ Usage:
  - ❖ <https://github.com/google/ExoPlayer/blob/r2.17.1/library/core/src/test/java/com/google/android/exoplayer2/offline/DefaultDownloadIndexTest.java>
  - ❖ instantiate instances of Download with defined internal states (attributes) for testing.



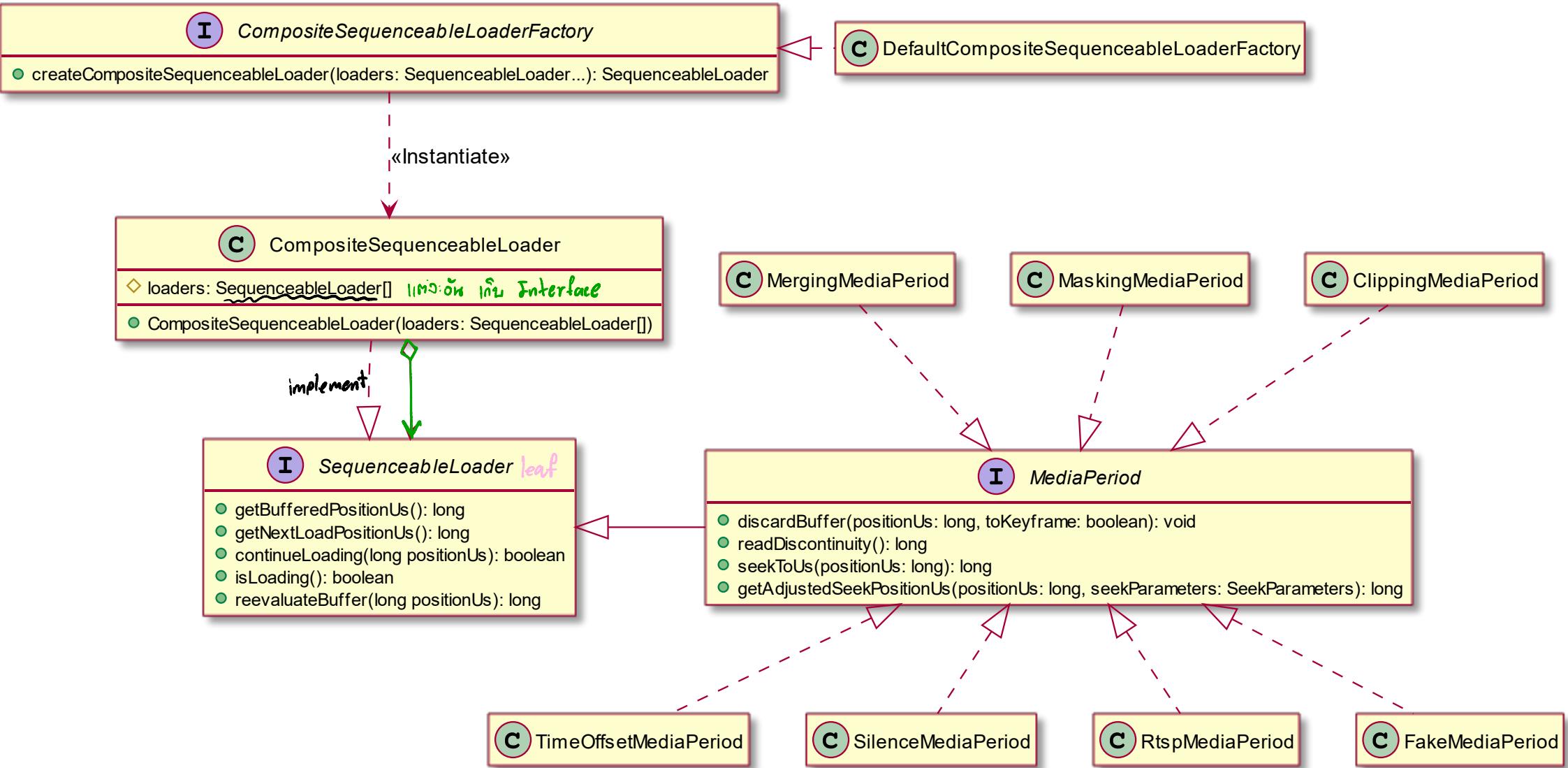
concrete Builder

product



# Composite Pattern

- ❖ <https://github.com/google/ExoPlayer/blob/r2.17.1/library/core/src/main/java/com/google/android/exoplayer2/source/CompositeSequenceableLoader.java>
- ❖ CompositeSequenceableLoader applies composite pattern
- ❖ Line 23: CompositeSequenceableLoader realizes SequenceableLoader interface
- ❖ Line 25: declare an array of SequenceableLoader
- ❖ Usage:
  - ❖ <https://github.com/google/ExoPlayer/blob/r2.17.1/library/core/src/main/java/com/google/android/exoplayer2/source/DefaultCompositeSequenceableLoaderFactory.java>
  - ❖ to store various SequenceableLoader objects (subtypes of MediaPeriod)



In class  
- Interface Listener

- Constructor မှတ်ဆောင် new object မှတ်
- getInstance(), စောင့်ရွက် Singleton

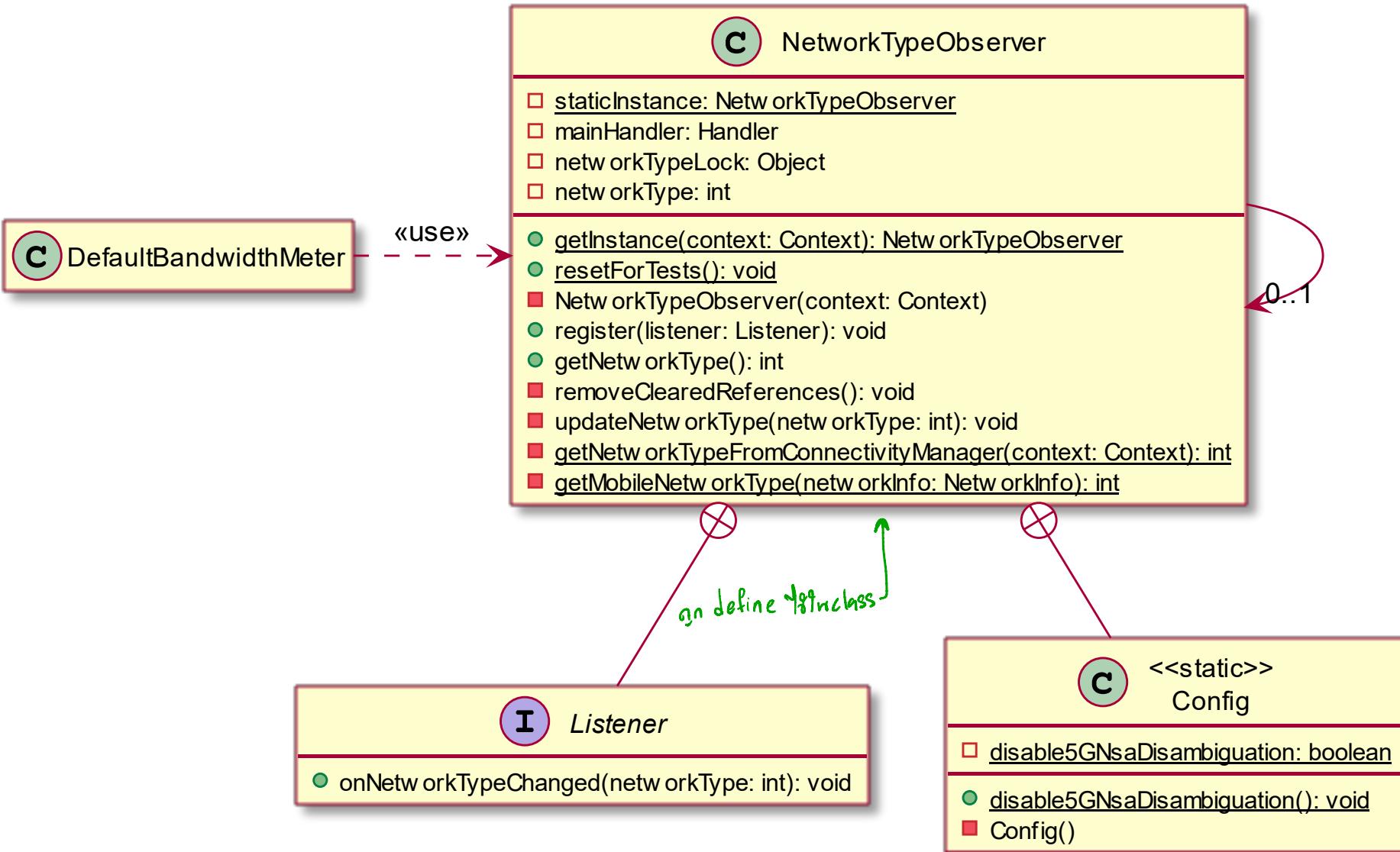
# Singleton Pattern

နှစ် monitor တောင်းယူလေ

ပို့ယောက်အောင် ပို့ယောက်များက ဘဲ type မှတ်ဆောင်မှု

0103-33  
ကာမားခြေားvideo  
ဖော်ပေါ်လောင်းပါး

- ❖ <https://github.com/google/ExoPlayer/blob/r2.17.1/library/common/src/main/java/com/google/android/exoplayer2/util/NetworkTypeObserver.java>
- ❖ NetworkTypeObserver applies singleton pattern
- ✓ ❖ Line 94 to 99: public static getInstance method ကိုမျှော်ဆောင်ရွက် ရှိနေဖို့
- ✓ ❖ Line 107: Constructor is private
- ❖ Usage:
  - ❖ <https://github.com/google/ExoPlayer/blob/r2.17.1/library/core/src/main/java/com/google/android/exoplayer2/upstream/DefaultBandwidthMeter.java>
  - ❖ to limit the number of network type change listener to one instance for bandwidth metering



ໂຕກົມໂພຣິໂຫຼມ “ກວດສອງ” ໝາຍເກມ ພົມກົມ

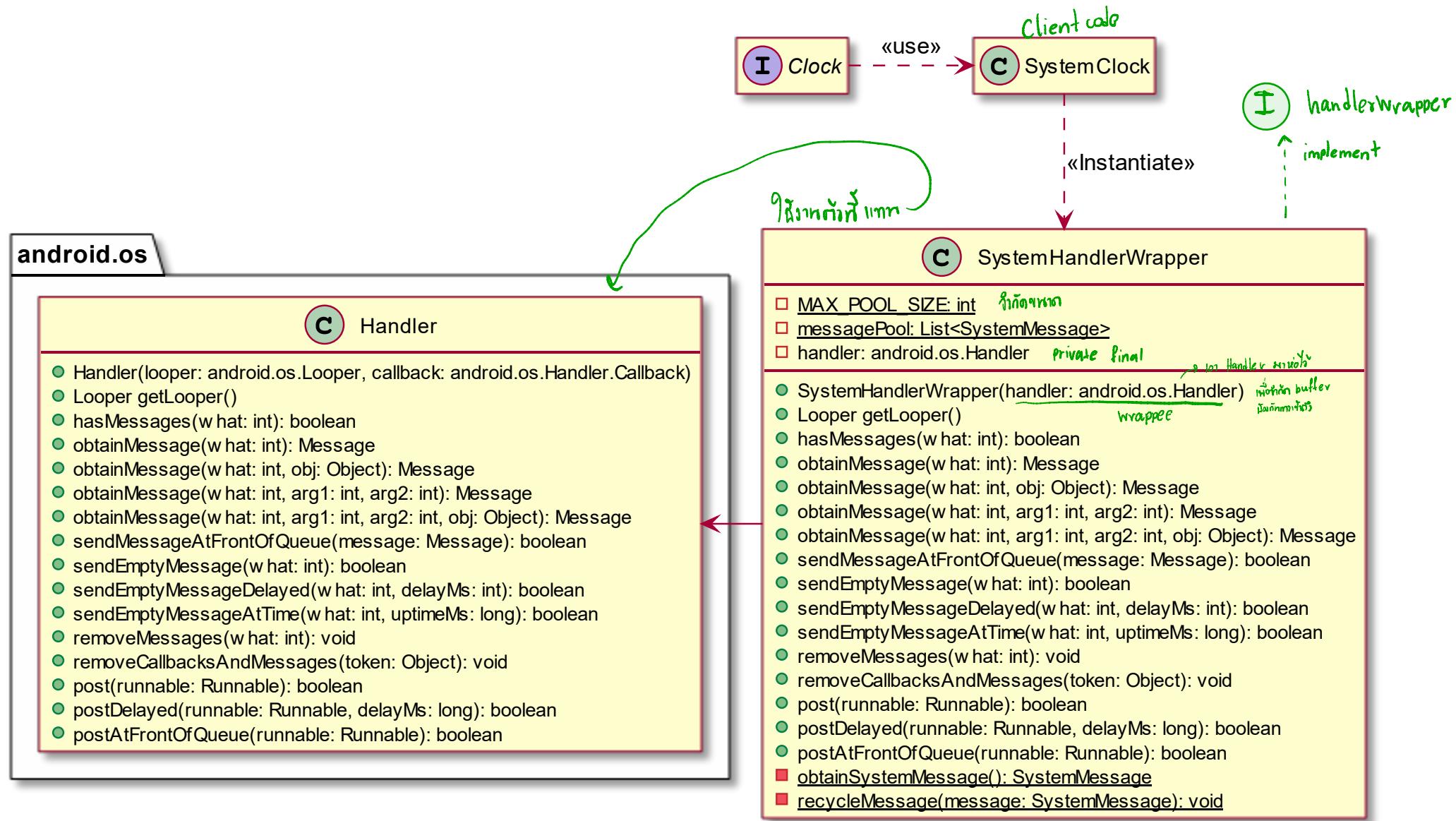
ດອານລ່າຍາດ

ສະແດງເຖິງ can ສະກຳ . . . . .

# Proxy Pattern

ໄລຍະ ຕົກລາມ System

- ❖ <https://github.com/google/ExoPlayer/blob/r2.17.1/library/common/src/main/java/com/google/android/exoplayer2/util/SystemHandlerWrapper.java>
- ❖ SystemHandler acts as a proxy
- ❖ Line 27 to 168: each method make a call on its wrapped object with the same method name
- ❖ Usage:
  - ❖ <https://github.com/google/ExoPlayer/blob/r2.17.1/library/common/src/main/java/com/google/android/exoplayer2/util/SystemClock.java>
  - ❖ to limit the pool size of SystemMessage



- Support user format
  - ...
  - ~~~ playlist
- பிளே ஸ்டிடியூம் என்ற பாகீஸ் கூடும் திட்டம்

## ExoPlayer

Builder pattern

- ↳ `Factory`
- ↳ `Builder`

Ex: `song.setArtist("SIA");`

↳ `new song.setArtist("SIA").setBuilder(builder)`

↳ `method return this (return current object or return object builder)`

- ↳ Downloader என்ற பாகீஸ் கூடும் திட்டம்
- Break down

Composite Pattern முன்னர் சொல்லப்பட்டது

- ↳ `Composite`
- ↳ `Leaf`
- ↳ `Composite`