

COMPSCI 230

Software Design and Construction

GUI Frameworks 2013-04-15



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 If you have questions, come to my office or email me :-)









Frameworks





Framework

Generic software platform for a certain type of applications

- Consists of **parts** that are found in many apps of that type
 - Libraries with APIs (classes with methods etc.)
 - Ready-made extensible programs ("engines")
 - Sometimes also tools
 - (e.g. for development, configuration, content)
- Often evolved by developing many apps of that type and **reusing code** more and more

Characteristics:

- **Reusable**: the parts can be used for many apps of that type
- Extensible: developers can add their own app-specific code
- Inversion of Control: framework often calls your code

Framework Examples



Multimedia Frameworks



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Web Application Frameworks





Extensibility

All frameworks can be extended to cater for app-specific functionality.

Common ways to extend a framework:

- Scripting: special programming language directly supported by the framework (e.g. JavaScript)
- Plug-ins: framework can load certain extra code in a specific format
- Within the framework language:
 - Subclassing & overriding methods
 - Implementing interfaces
 - Registering event handlers





Inversion of Control

Traditional Program Execution



The app has control over the execution flow, calling library code when it needs to.

Inversion of Control



The framework has control over the execution flow, calling app code for app-specific behavior.



Inversion of Control Example: Java Applets



Should I Use A Framework?

Advantages

- Reuse can save cost and time
- Higher level of abstraction
 - Less low-level work
 - Easier to understand
 (if the framework has a good API)
- Reduced maintenance cost (if the framework is maintained by someone else)

Disadvantages

- Can lead to code bloat
 - Framework may contain lots of unused code
 - May need to use several frameworks
- Cost of **learning** a framework (needs to be amortised by reuse)
- Licensing cost (for commercial frameworks)
- Risk of vendor lock-in













Frameworks are platforms for certain apps

- Contain common, **reusable parts**
- **Extensible** with scripting, plug-ins, inheritance etc.
- Use Inversion of Control
- Using a framework typically saves a lot of work in the long run
- But you should select the frameworks you use carefully (initial investment of learning, licensing costs, risks)





- 1. Describe three common characteristics of a framework.
- 2. Give an example of inversion of control.
- 3. Describe an advantage and a possible disadvantage of using a framework, using a game engine as an example.

