Overview of Design Patterns in C++

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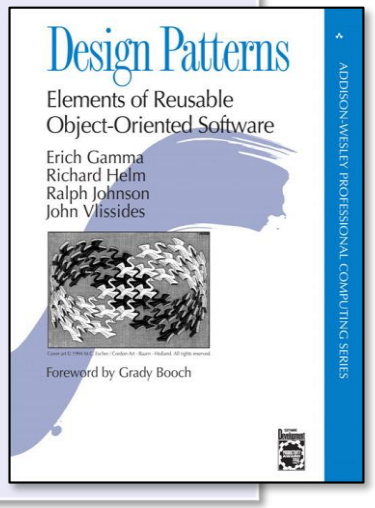
Learning Objectives in this Lesson

- Know what topics we'll cover

	Creational	Structural	Behavioral
Class	Factory Method √	Adapter (class) √	Interpreter √ Template Method √
Object	Abstract Factory √ Builder √ Prototype Singleton √	Adapter (object) √ Bridge √ Composite √ Decorator √ Flyweight Façade Proxy	Chain of Responsibility Command √ Iterator √ Mediator Memento Observer √ State √ Strategy √ Visitor √



Learning Objectives in this Lesson

- Know what topics we'll cover
- Be aware of other digital learning resources

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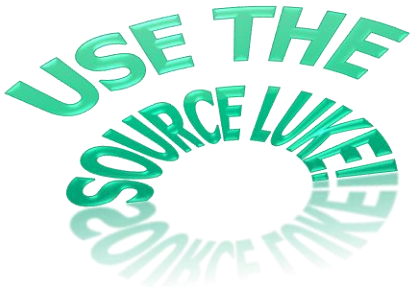
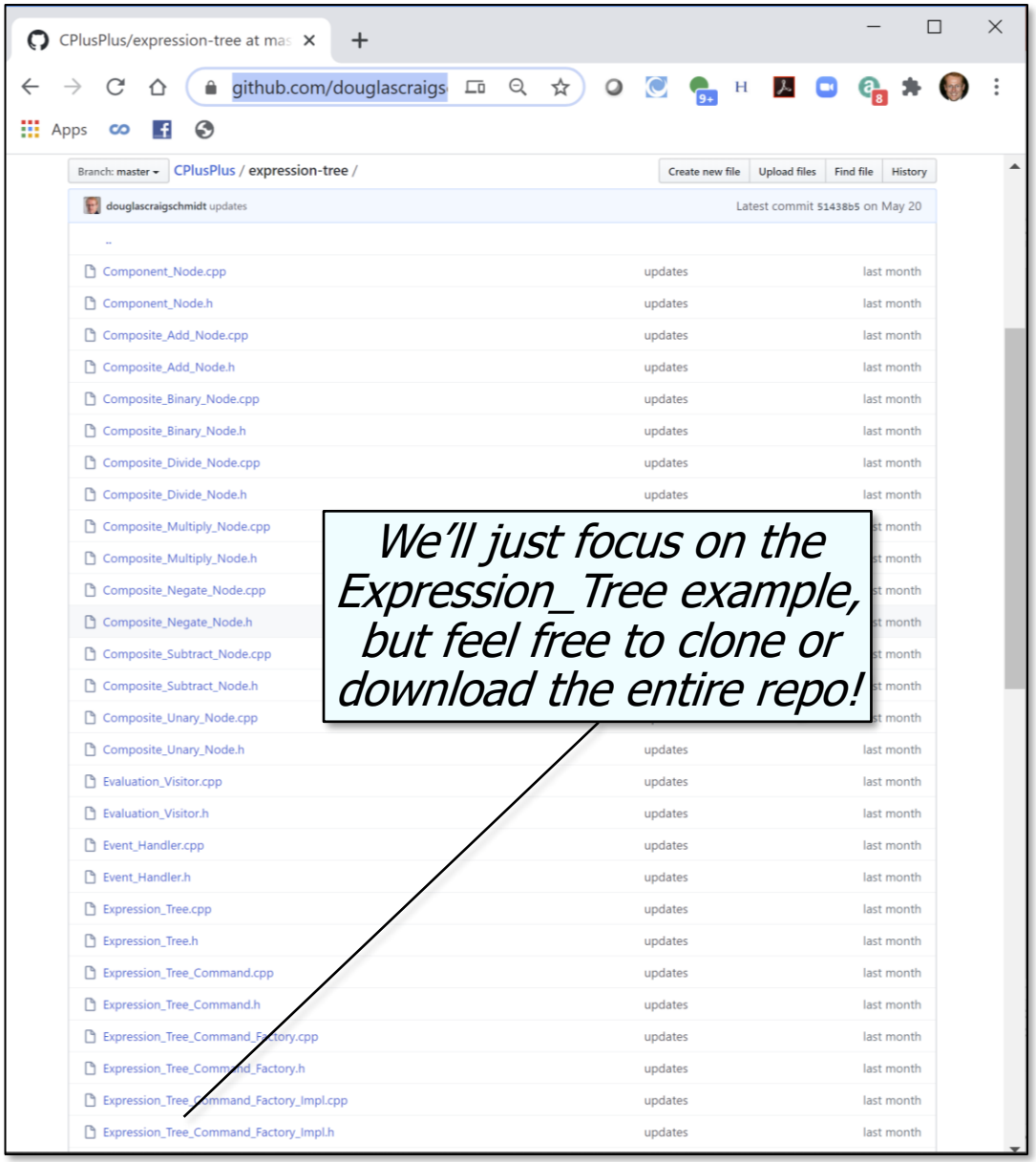
- Be aware of other digital learning resources
- Be able to locate examples of the C++ case study app





See github.com/douglascraigschmidt/CPlusPlus/tree/master/expression-tree

Overview of this Part of the Course

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- We focus on programming "Gang-of-Four" (GoF) design patterns in C++, e.g.

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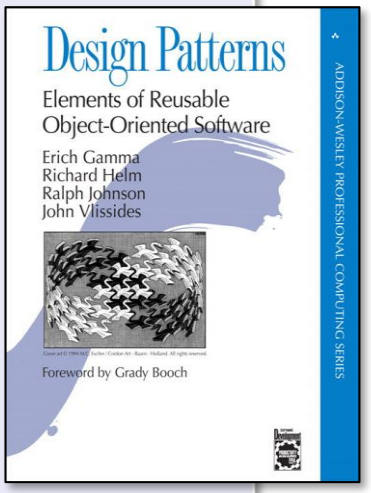


Overview of this Part of the Course

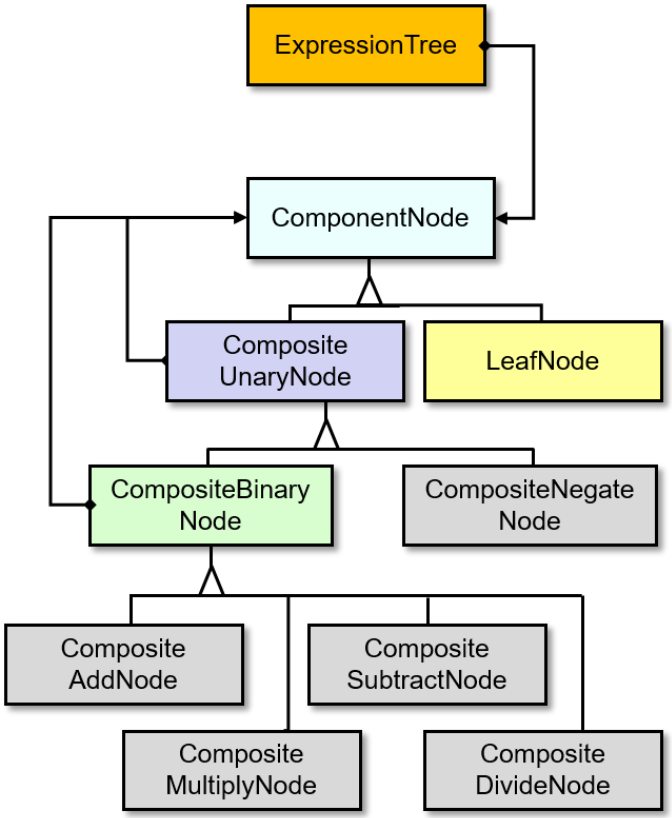
- We apply many GoF patterns in the context of a case study app

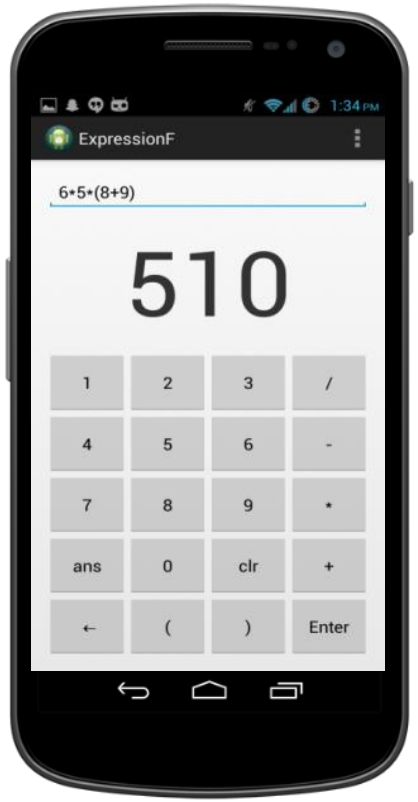
Design Problem	Pattern
Non-extensible & error-prone designs	Composite
Minimizing impact of variability	Bridge
Inflexible expression input processing	Interpreter
Inflexible interpreter output	Builder
Scattered request implementations	Command
Inflexible creation of variabilities	Factory Method
Inflexible expression tree traversal	Iterator
Obtrusive behavior changes	Strategy
Non-extensible tree operations	Visitor
Incorrect user request ordering	State
Non-extensible operating modes	Template Method
Minimizing global variable liabilities	Singleton

See github.com/douglascraigschmidt/CPlusPlus/tree/master/expression-tree

Overview of this Part of the Course

- This course focuses on both pattern-oriented design & implementation topics



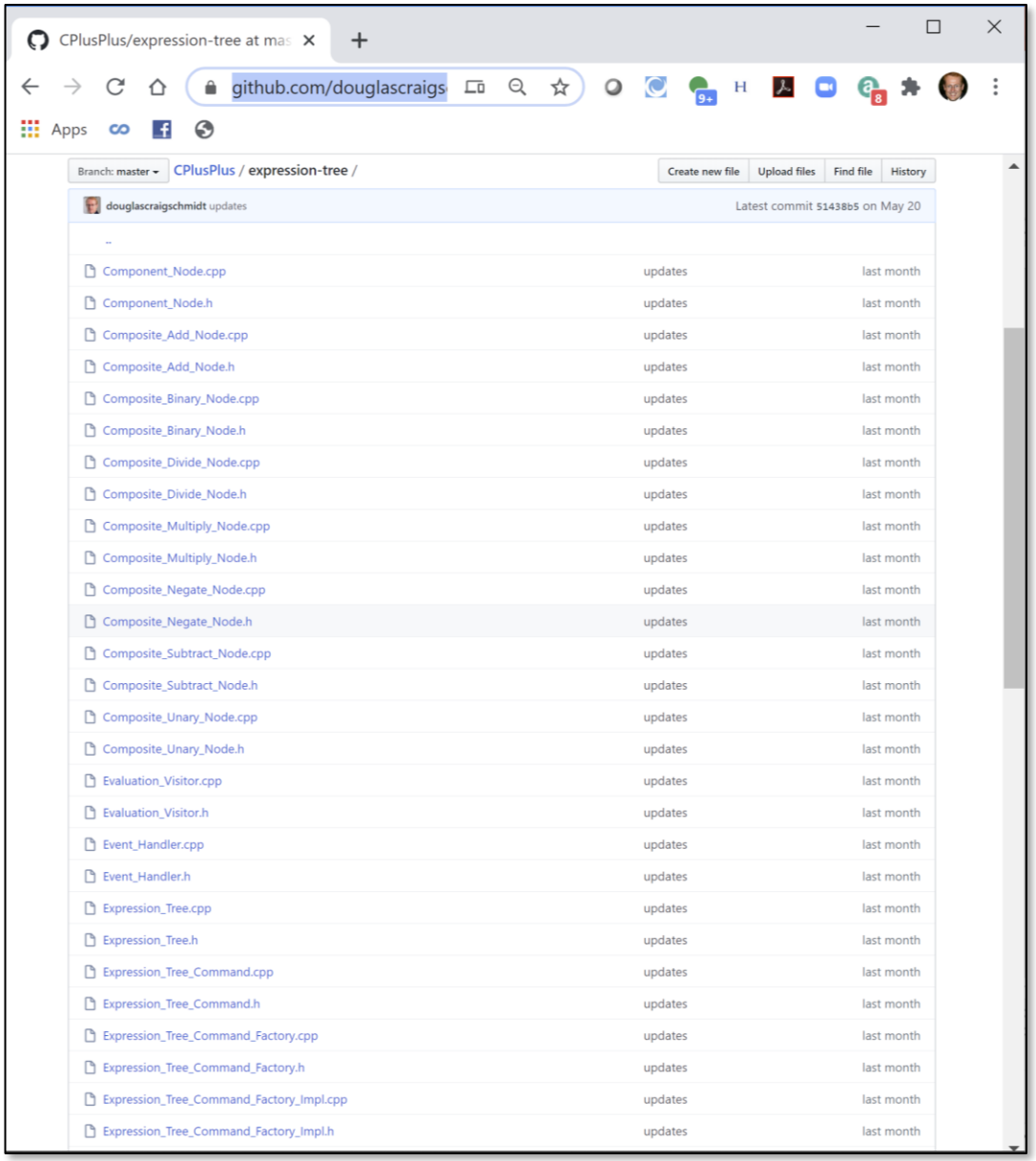



```
Expression_Tree
  expr_tree = ...;
Visitor print_visitor
  = ...;

for (auto iter = tree.begin
                    (order);
     iter != tree.end
                    (order);
     ++iter)
   (*iter).accept
     (print_visitor);
```

Overview of this Part of the Course

- The C++ expression tree processing app we cover is available on github



See github.com/douglascraigschmidt/CPlusPlus/tree/master/expression-tree

Other Digital Learning Resources

Other Digital Learning Resources

- See my website for many more videos & screencasts related to programming with patterns, frameworks, C++, Java, etc.

Digital Learning Offerings

Douglas C. Schmidt (d.schmidt@vanderbilt.edu)
Associate Chair of Computer Science and Engineering, Professor of Computer Science, and Senior Researcher in the Institute for Software Integrated Systems (ISIS) at Vanderbilt University

O'Reilly LiveTraining Courses

- Programming with Java 8 Lambdas and Streams
  - January 9th, 2018, 9:00am-12:00pm central time
  - February 1st, 2018, 9:00am-12:00pm central time
  - March 1st, 2018, 9:00am-12:00pm central time
- Scalable Programming with Java 8 Parallel Streams
  - January 10th, 2018, 11:00am-3:00pm central time
  - February 6th, 2018, 11:00am-3:00pm central time
  - March 6th, 2018, 11:00am-3:00pm central time
- Reactive Programming with Java 8 Completable Futures
  - January 12th, 2018, 10:00am-1:00pm central time
  - February 13th, 2018, 10:00am-2:00pm central time
  - March 13th, 2018, 10:00am-2:00pm central time

Pearson LiveLessons Courses

- Java Concurrency
- Design Patterns in Java

Coursera MOOCs

- Android App Development Coursera Specialization
- Pattern-Oriented Software Architecture (POSA)

Vanderbilt University Courses

- Playlist from my YouTube Channel videos from CS 891: Introduction to Concurrent and Parallel Java Programming with Android
- Playlist from my YouTube Channel videos from CS 892: Concurrent Java Programming with Android
- Playlist from my YouTube Channel videos from CS 251: Intermediate Software Design with Java
- Playlist from my YouTube Channel videos from CS 282: Concurrent Java Network Programming in Android
- Playlist from my YouTube Channel videos from CS 251: Intermediate Software Design with C++
- Playlist from my YouTube Channel videos from CS 282: Systems Programming for Android

See www.dre.vanderbilt.edu/~schmidt/DigitalLearning

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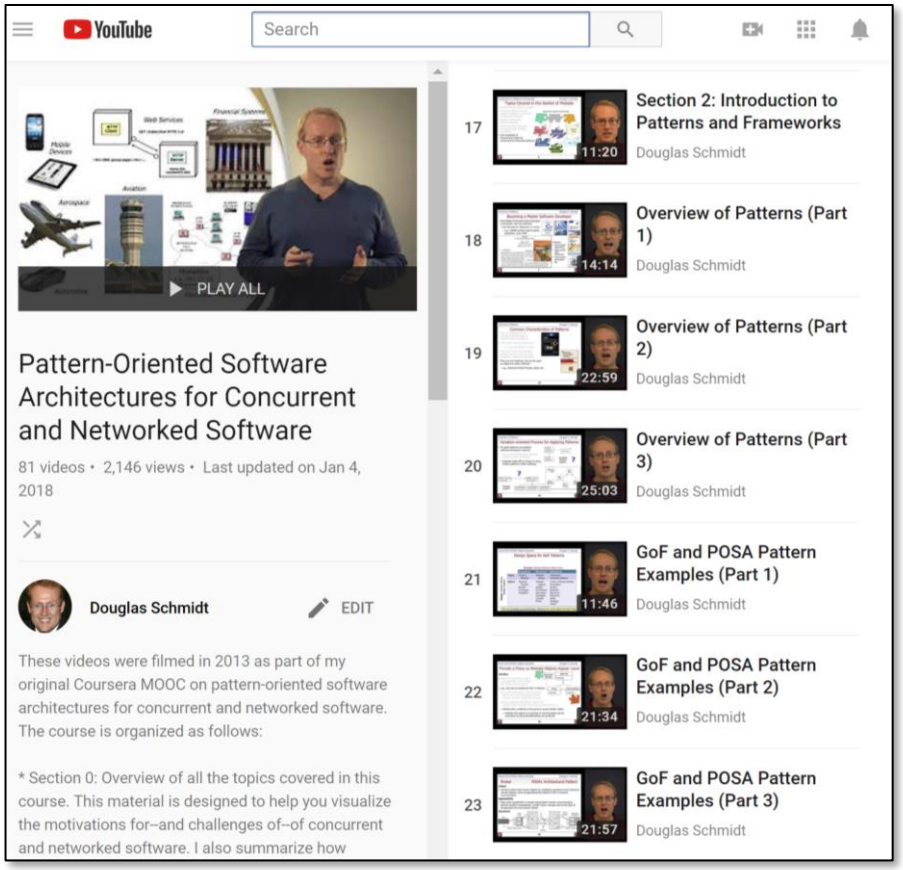
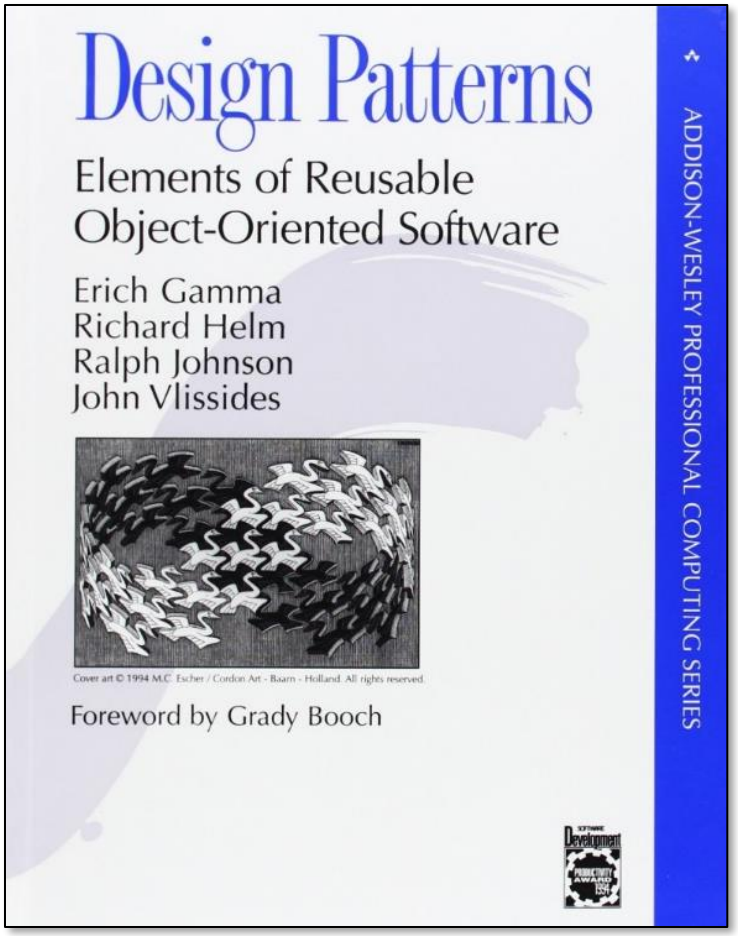
  - Videos from my MOOC "Pattern-Oriented Software Architecture" are relevant!



See www.youtube.com/playlist?list=PLZ9NgFYEMxp6CHE-QQ040tlDILNcBqJnc

Other Digital Learning Resources

- The book *Design Patterns: Elements of Reusable Object-Oriented Software* describes all the Gang-of-Four (GoF) patterns in detail



See en.wikipedia.org/wiki/Design_Patterns

Other Digital Learning Resources

- The "POSA" books contain good sources of material on other types of patterns & pattern relationships

See www.dre.vanderbilt.edu/~schmidt/POSA

End of Course Overview