# Module 22: "Visitor"





# Agenda

- ▶ Introductory Example: Employees and Projects
- Challenges
- Implementing the Visitor Pattern
- Pattern: Visitor
- Overview of Visitor Pattern
- Pros and Cons of Visitor





## Introductory Example: Employees and Projects

```
decimal expenses = 0;
foreach (Employee employee in company.Employees)
    expenses += 1 880 * employee.StockOptions;
foreach (Project project in company.Projects)
    if( project.State == ProjectState.InProgress &&
        project.HoursWorked < project.HoursBudget )</pre>
        expenses += 1 095 * (project.HoursBudget - project.HoursWorked);
Console.WriteLine( $"{remainingExpenses:c}" );
```



# Challenges

- How do we move the traversal logic somewhere appropriate?
- ▶ How do we facilitate future extensions to the hierarchy that we has not yet been specified?
- Can we satisfy the Open/Closed Principle?
- What about the Single Responsibility Principle?





## Pattern: Visitor

Represent a method to be performed on the elements of an object structure. Visitor lets you define a new method without changing the classes of the elements on which it operates.

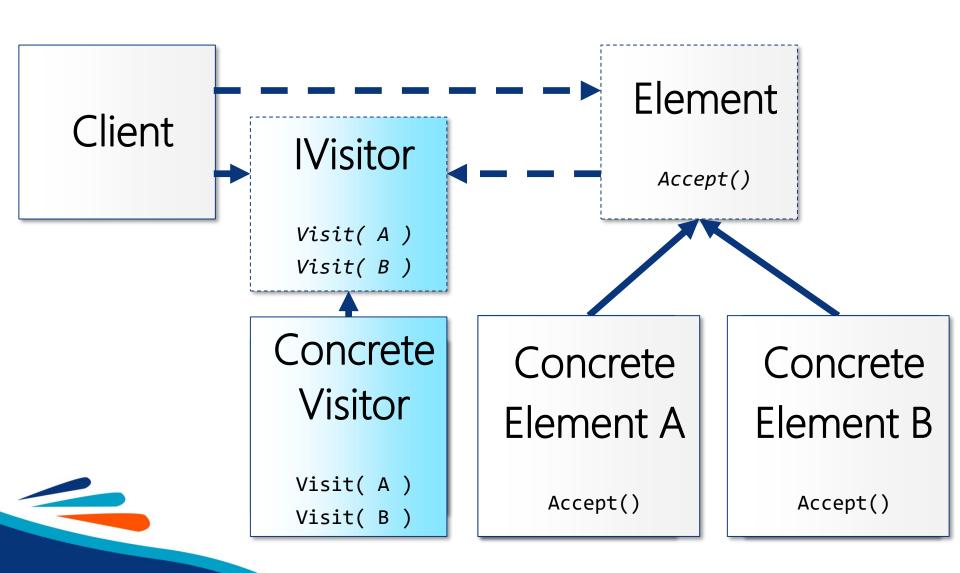
#### Outline

- Define a visitor object implementing an operation on each type of elements of the object structure
- Traverse the object structure by calling accept on an element
  - Request is dispatched back to the accepted visitor's appropriate method
- Origin: Gang of Four



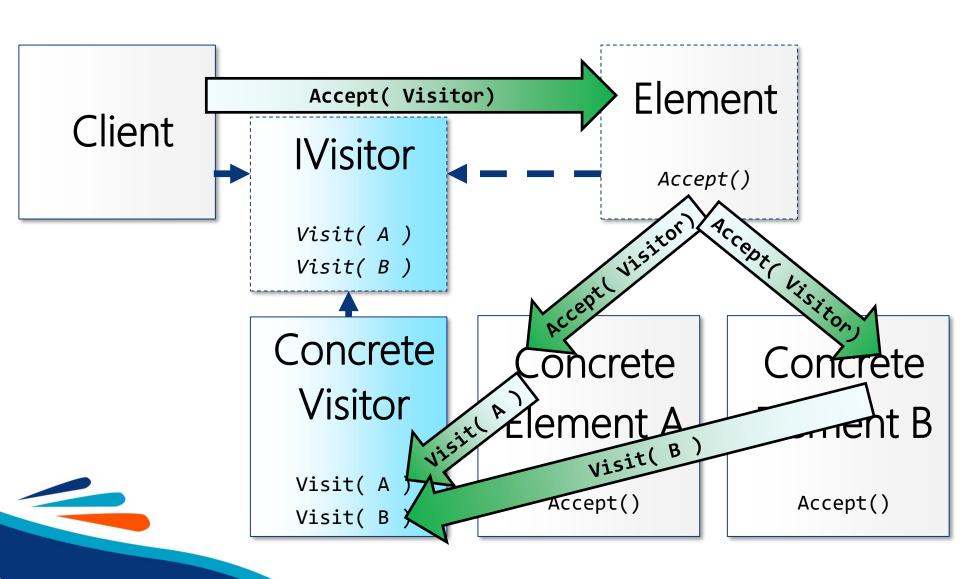


## Overview of Visitor Pattern





#### Overview of Visitor Pattern





### Overview of Visitor Pattern

- Client
  - Creates Concrete Visitor and invokes **Accept()** method with visitor object
- Element
  - Interface or abstract base class with abstract Accept() method
- Concrete Element
  - Contains a concrete implementation of Accept() method invoking appropriate Visit() method on Visitor
- IVisitor
  - Interface or abstract base class with abstract Visit() methods for each Concrete Element
- Concrete Visitor
  - Implements concrete functionality in the set of Visit() methods



#### Pros and Cons of Visitor

#### Pros

- Crucial for Open/Closed Principle
- Conforms to the Single Responsibility Principle
- A generally applicable solution for very different operations
- Excellent for APIs and class libraries
- Mixes well with Composite and Interpreter

#### Cons

- Can be quirky to add more hierarchy element classes
  - Visitors need more Visit() methods
- Only works for publicly accessible data





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