

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 )
    {
        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?

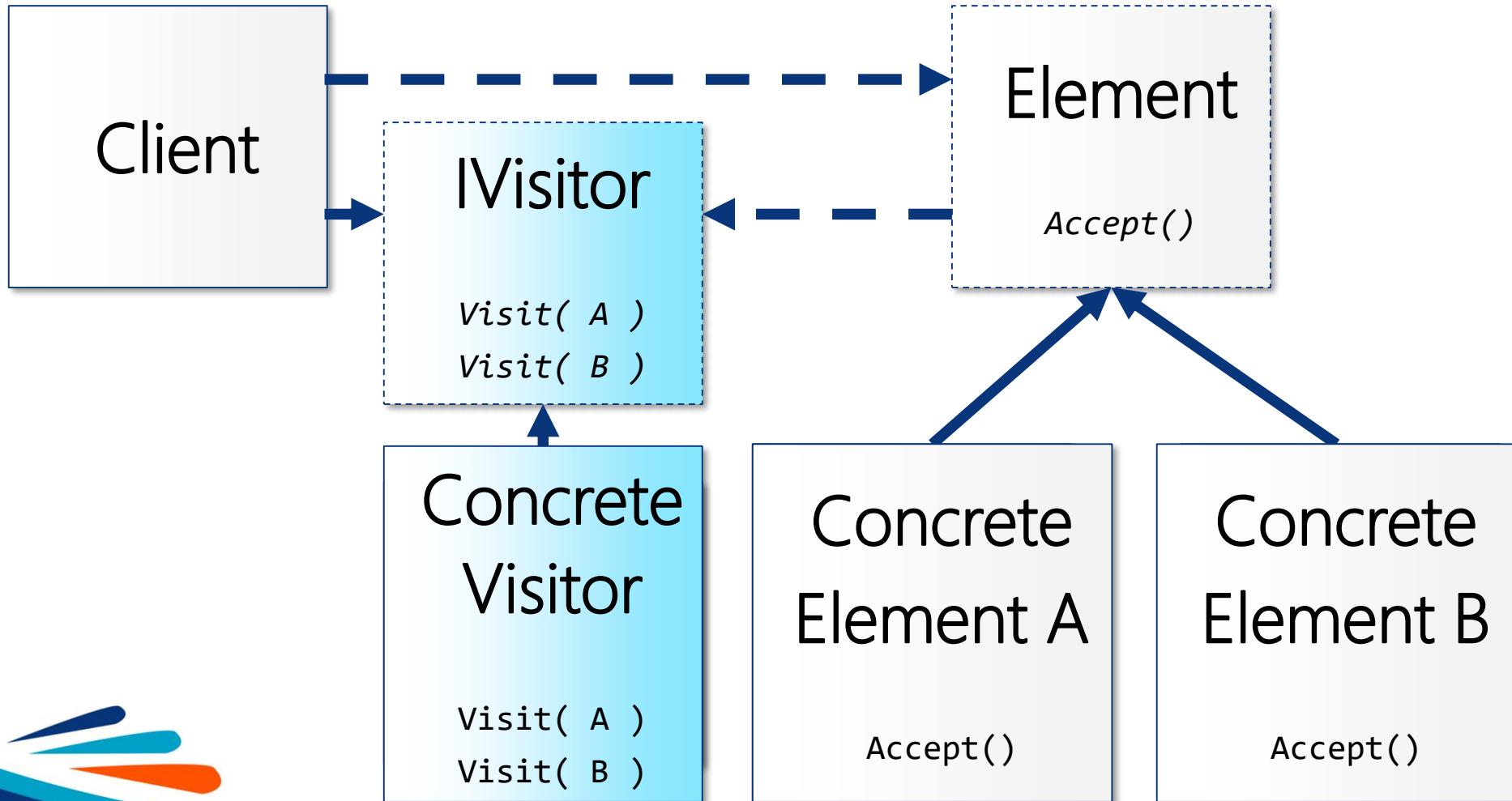


Pattern: Visitor

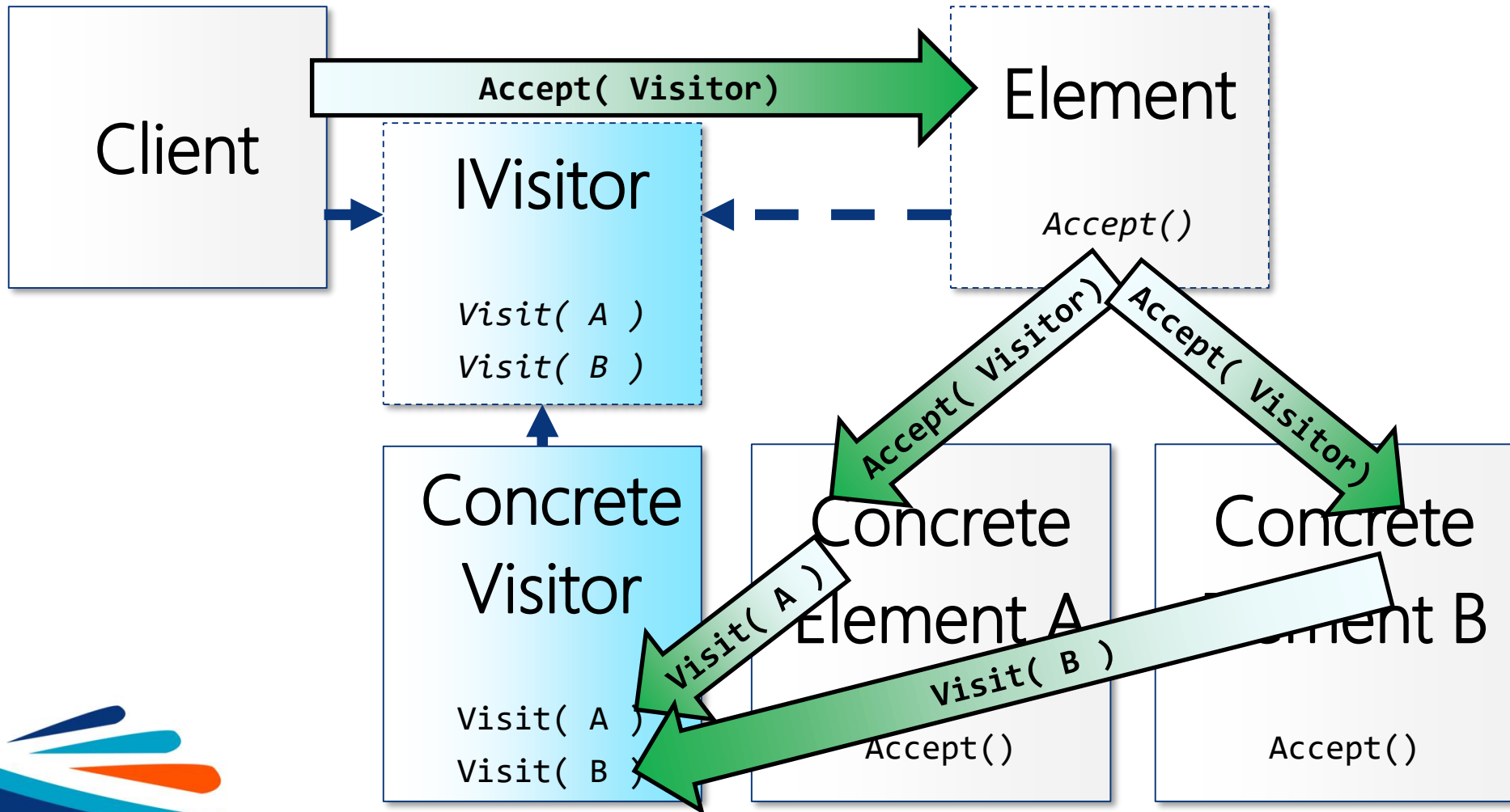
- ▶ *Represent a method to be performed on the elements of an object structure. Visitor lets you define a new method without changing the classes of the elements on which it operates.*
- ▶ Outline
 - Define a visitor object implementing an operation on each type of elements of the object structure
 - 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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