Abstract Factory GoF Object Creational

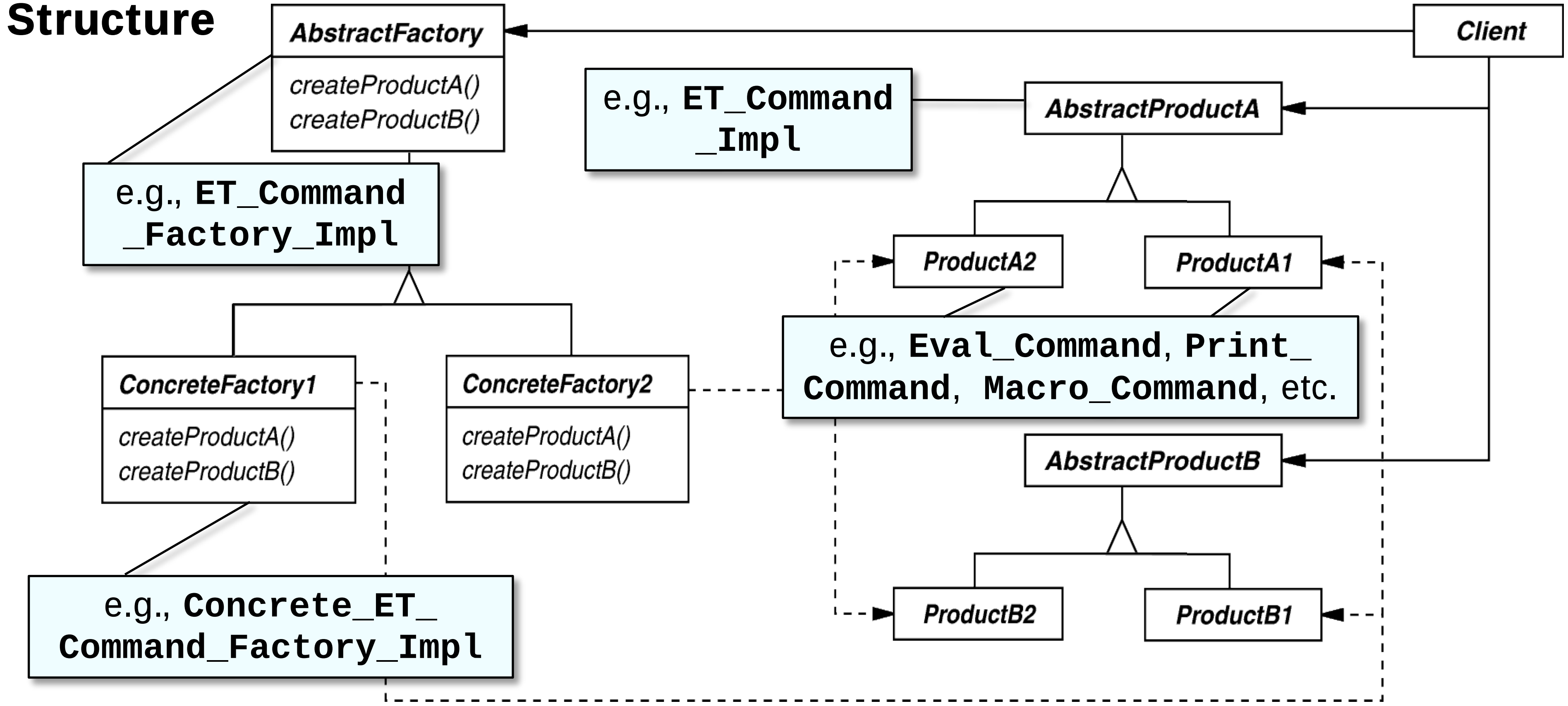
Intent

- Create families of related objects without specifying subclass names

Applicability

- When clients cannot anticipate groups of classes to instantiate

Structure



Abstract Factory GoF Object Creational

Abstract Factory example in C++

- Create families of related objects without specifying subclass names

```
class Concrete_ET_Command_Factory_Impl
                                : public ET_Command_Factory_Impl {
public:
  Concrete_ET_Command_Factory_Impl() {
    command_map_["format"] = &make_format_command;
    command_map_["expr"] = &make_expr_command;
    command_map_["eval"] = &make_eval_command;
    ...
```

std::map associating command names to pointer-to-member-function command factories

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    command_map_["expr"] = &make_expr_command;
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    ...

  virtual ET_Command make_command(const std::string &input) {
     auto iter = command_map_.find(command_name(input));
     if (iter != command_map_.end()) {
       auto ptmf = iter->second;
       return (this->*ptmf)(command_parameter(input));
     }
  ...
```

The primary factory method that creates the designated command based on user input

Dispatch command factory method via returned via map

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Consequences

+ *Flexibility*: Removes type (i.e., subclass) dependencies from clients

+ *Abstraction & semantic checking*: Encapsulates product's composition

– *Complexity*: Tedious to extend factory interface to create new products

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Implementation

- Parameterization as a way of controlling interface size
- Configuration with prototypes to determine who creates the factories
- Abstract factories are essentially groups of factory methods

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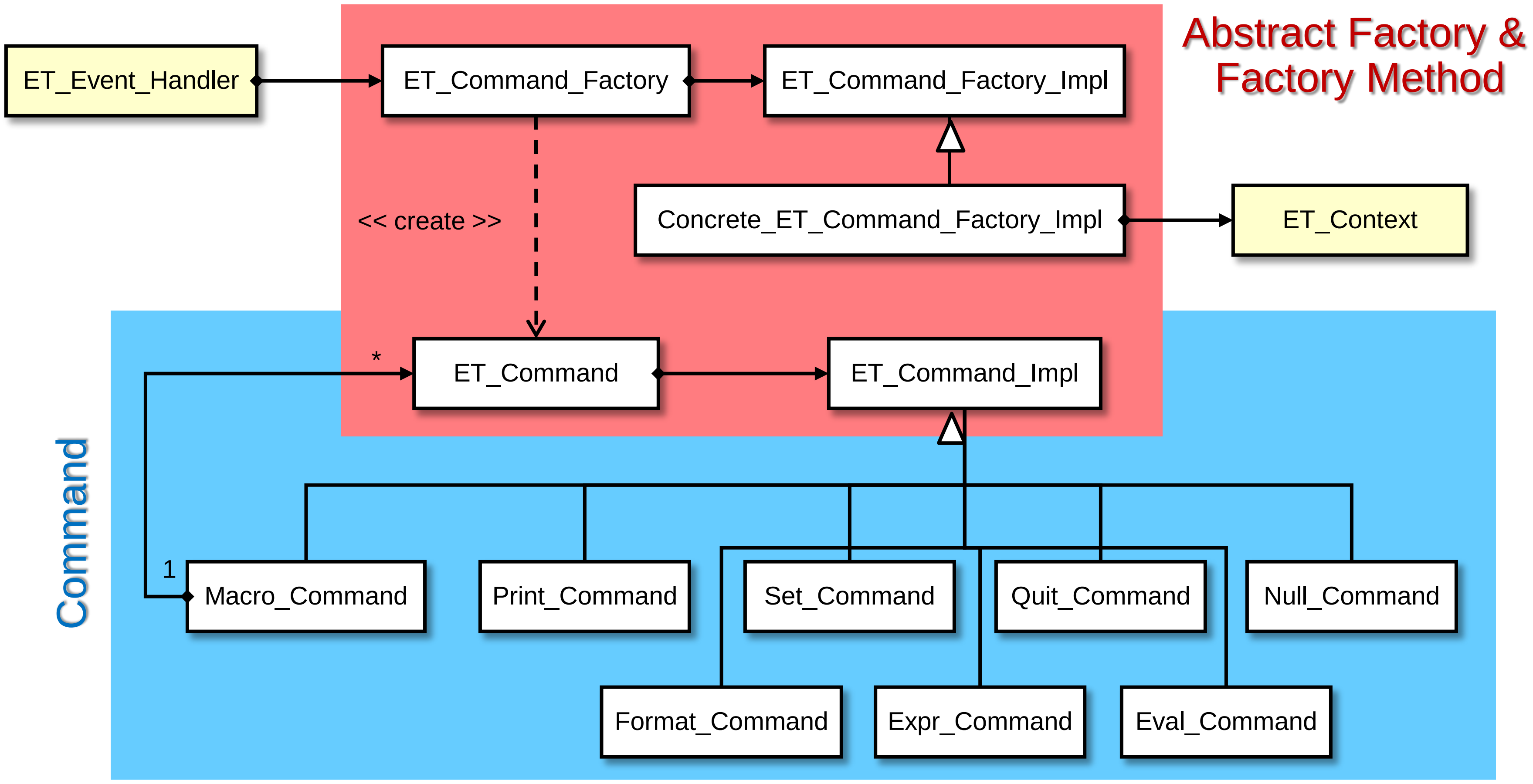
Known Uses

- InterViews Kits
- ET++ WindowSystem
- AWT Toolkit
- The ACE ORB (TAO)

Summary of Command & Factory Patterns

Abstract Factory contains *Factory Methods* that create *Command* objects, which then dictate how users interact with an expression tree processing app



These patterns enable extensibility of operations via new factory methods