



FAKULTÄT FÜR  
INFORMATIK

# FeatureIDE: Background

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# Feature-Oriented Programming (FOP)

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- ▶ Introduced 1997 by Christian Prehofer
- ▶ Based on Object-Oriented Programming
- ▶ Features realize functionalities
- ▶ Features are cross-cutting to objects
- ▶ Features modularize fragments from certain classes
- ▶ Fragment contains some methods/fields of a class belonging to one functionality
- ▶ Goals: code traceability, software customization

# FOP Example

```
package util;
class Calc {
  void add() {
    e0 = e1 + e0;
    e1 = e2;
  }
}
```

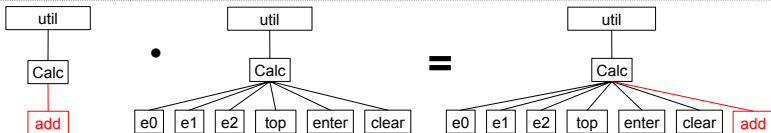
feature: Add

```
package util;
class Calc {
  int e0 = 0, e1 = 0,
      e2 = 0;
  void enter(int val) {
    e2 = e1; e1 = e0;
    e0 = val;
  }
  void clear() {
    e0 = e1 = e2 = 0;
  }
  String top() {
    return String.
      valueOf(e0);
  }
}
```

feature: CalcBase

feature: CalcAdd

```
package util;
class Calc {
  int e0 = 0, e1 = 0,
      e2 = 0;
  void enter(int val) {
    e2 = e1; e1 = e0;
    e0 = val;
  }
  void clear() {
    e0 = e1 = e2 = 0;
  }
  String top() {
    //...
  }
  void add() {
    e0 = e1 + e0;
    e1 = e2;
  }
}
```



[http://wwiti.cs.uni-magdeburg.de/iti\\_db/lehre/epmd/2009/slides/06\\_FOP.pdf](http://wwiti.cs.uni-magdeburg.de/iti_db/lehre/epmd/2009/slides/06_FOP.pdf)

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# Composition Engines

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Feature Orientated Command-line tools used to compose files within FeatureIDE:

- ▶ AHEAD (mixin): .jak (Java 1.4)  
<http://userweb.cs.utexas.edu/~schwartz/ATS.html>
- ▶ FeatureC++: .cpp (C++)  
<http://www.fosd.de/fcpp>
- ▶ FeatureHouse: .java (Java 1.5), .cs (C#), .c/.h (C), .hs (Haskell), .jj (JavaCC), .als (Alloy), .xmi (UML)  
<http://www.fosd.de/fh>

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# Composition Engines

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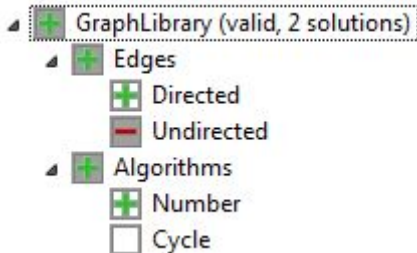
Non Feature Orientated Command-line tools used to compose files within FeatureIDE:

- ▶ AspectJ(Aspectorientated Java): .aj(Aspect File), .java  
<http://www.eclipse.org/aspectj/>
- ▶ DeltaJ(Deltaorientated Java): .dj(Core and Delta Modules)  
<http://sourceforge.net/projects/deltaj/>
- ▶ Munge: Preprocessor  
<http://sonatype.github.com/munge-maven-plugin/>
- ▶ Antenna: Preprocessor  
<http://antenna.sourceforge.net/>

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# Configuration

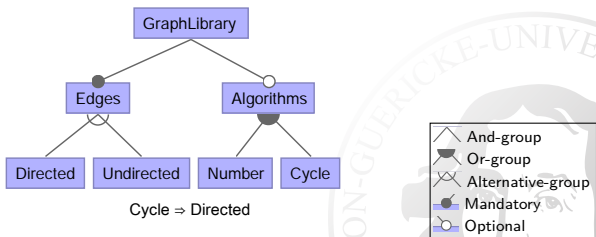
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- ▶ Selection of features
- ▶ Composition of features results in a program variant
- ▶ Not all combinations are useful

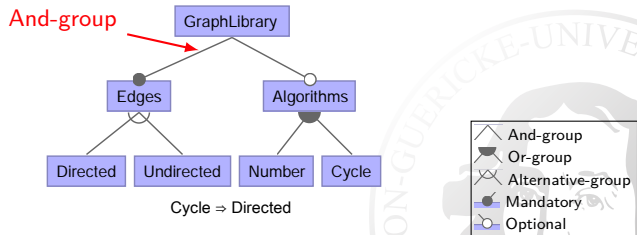
# Feature Model

- ▶ Specifies valid combinations of features
- ▶ Graphically represented by a feature diagram
- ▶ Created for a particular domain
- ▶ Describes a software product line (SPL)



# Feature Model

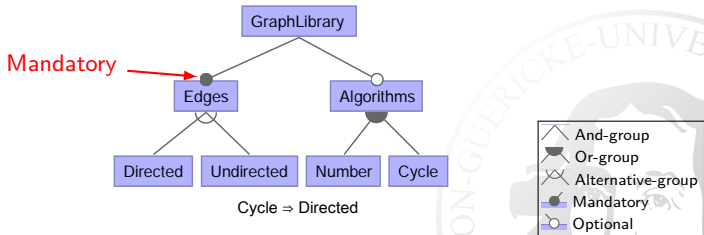
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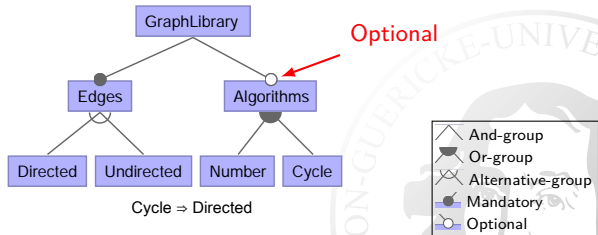
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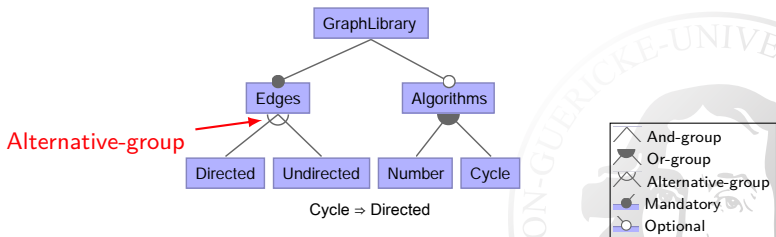
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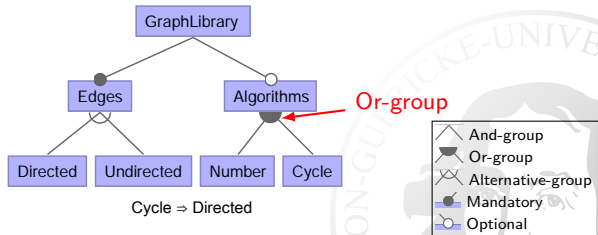
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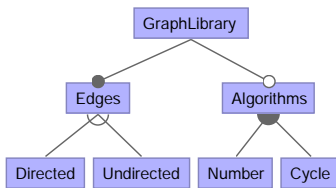
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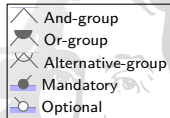


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Cross-tree constraints → Cycle ⇒ Directed



# Feature-Oriented Software Development (FOSD)

