

Software product lines

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Software product lines basic concepts

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Um produto



www.usm.maine.edu

Uma família de produtos



it.zaobao.com

Produtos com várias funcionalidades comuns mas com variações entre si

Agora passando de produtos de hardware para software...

Program families are sets of programs whose **common properties** are so extensive that it is advantageous to study the common properties of the programs before analyzing individual members

Adapted from: On the Design and Development of Program Families (Parnas 1976)

Aparelhos diferentes, 15 a 60 aplicações diferentes...



64kb, flip



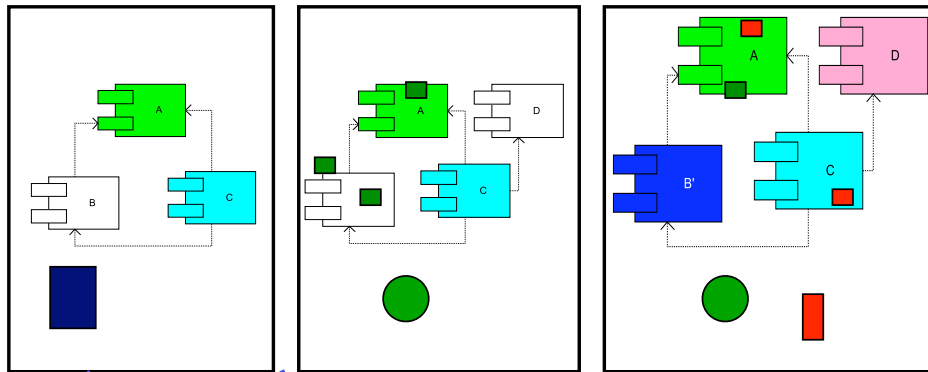
4Mb, flip



100Kb, sem flip

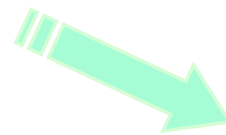
Produtos diferentes para clientes diferentes

Pouco reuso e agilidade, alto custo



Mesmo com J2ME!

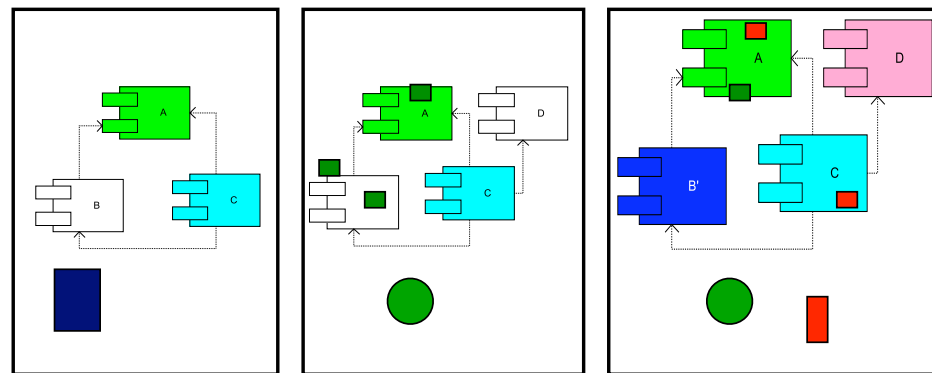
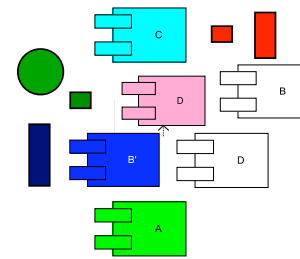
```
100 public void drawGraphics() {
101     if (this.collidomonst < 0) {
102         // Draw the dragon
103         g.drawImage(this.getImg(),
104             this.getX(),
105             this.getY(),
106             this.getWidth(),
107             this.getHeight());
108     }
109     // Draw the breath of fire
110     if (this.collidomonst > 0) {
111         if (this.collidomonst > 0) {
112             if (this.collidomonst > 0) {
113                 // Draw the breath of fire
114                 g.drawImage(this.getImg(),
115                     this.getX(),
116                     this.getY(),
117                     this.getWidth(),
118                     this.getHeight());
119             }
120         }
121     }
122 }
123 // Draw the breath of fire
124 if (this.collidomonst > 0) {
125     // Draw the breath of fire
126     g.drawImage(this.getImg(),
127         this.getX(),
128         this.getY(),
129         this.getWidth(),
130         this.getHeight());
131 }
132 }
```



Usar controle de
versão com um
branch para cada
produto?

Solução: **linha** de produtos

Reuso estratégico de artefatos comuns e variações



A software product line is...

a set of software-intensive systems **sharing a common, managed set of features** that satisfy the specific needs of a **particular market segment or mission** and that are developed from a **common set of core assets in a prescribed way**

Software Product Lines, Practices and Patterns.
Clements and Northrop 2002.

Family = Line?

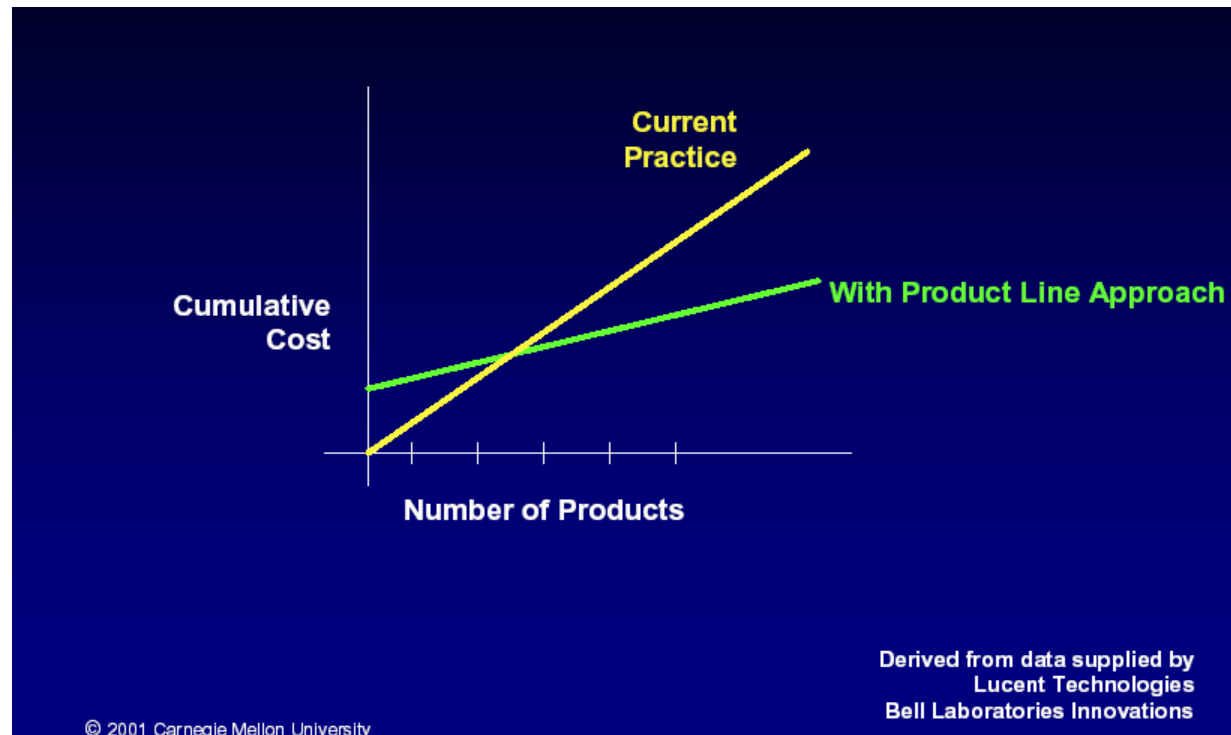
- Family

- Elements

- Line

Support that enables the generation of the elements

Economia de escopo



Benefícios

- Oferta de vários produtos sem multiplicação de custos (mass customization)
 - 700 builds a um preço pouco maior que o de 1
- Maior fatoramento dos custos de desenvolvimento entre vários clientes
- Aumento de produtividade
 - redução em custos, time to market, e número de desenvolvedores
- Maior qualidade
- ...

Population

- Sharing as in a family, but with more significant changes between products
- Might consist of separate families
 - family of DVD players
 - family of digital TV set top boxes
- Not necessarily a single architecture with the same plug and play options

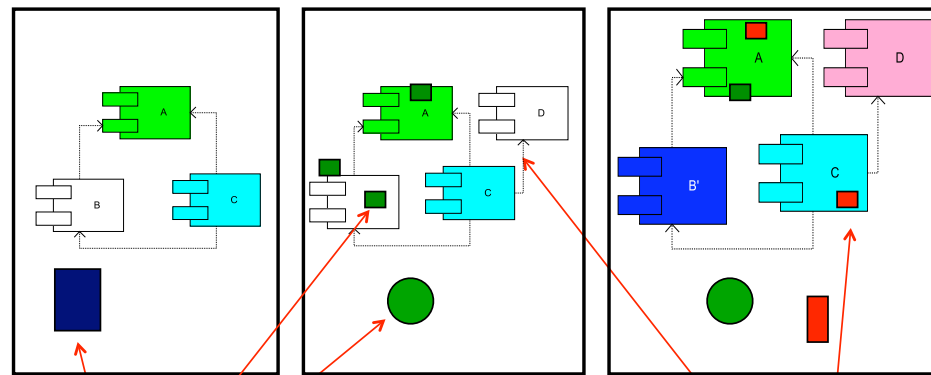
Better understanding the definition...

a set of software-intensive systems **sharing a common, managed set of features** that satisfy the specific needs of a **particular market segment or mission** and that are developed from a **common set of core assets in a prescribed way**

Feature

- User-visible aspect or characteristic of the family (Kang 1990)
 - define both common aspects of the family as well as differences between products in the family
- Logical unit of behavior specified by a set of functional and quality requirements (Bosch 2000)
- Groups requirements

Variations and variations points

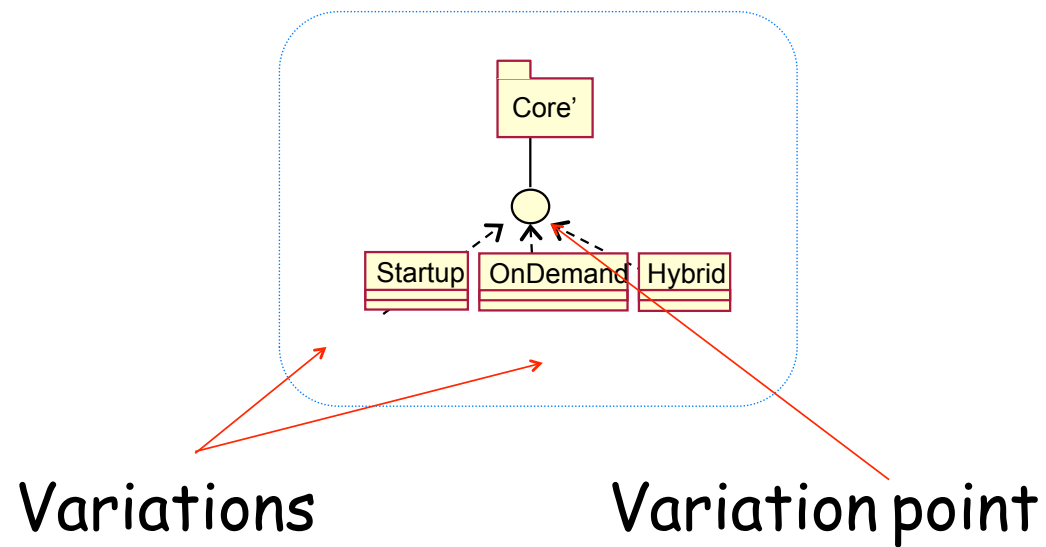


Variations

Variation points



Mechanisms for managing variations



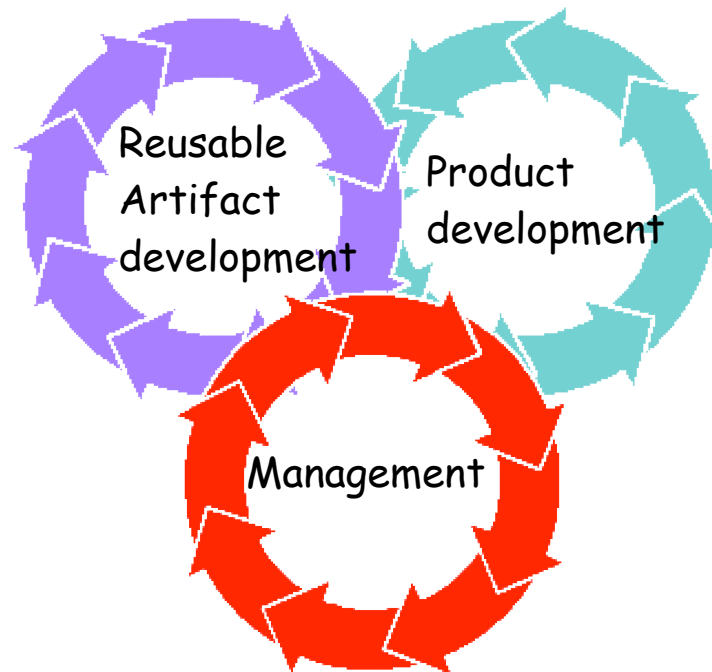
Variations and features

- Each feature is realized by a set of **core assets**
 - variations
 - common behavior
 - common architecture
- Both are managed

Might not exist!

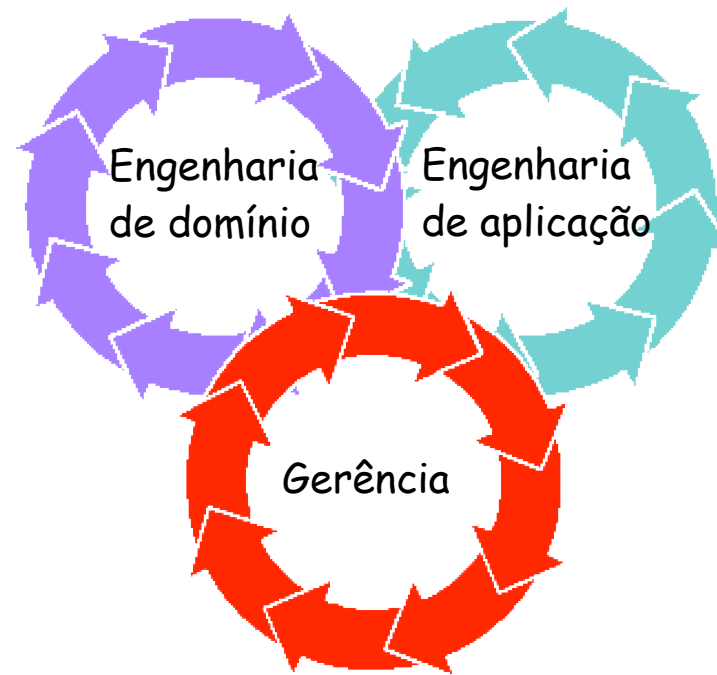


Atividades para criar uma linha de produtos



Fonte:SEI

Outros nomes para as atividades

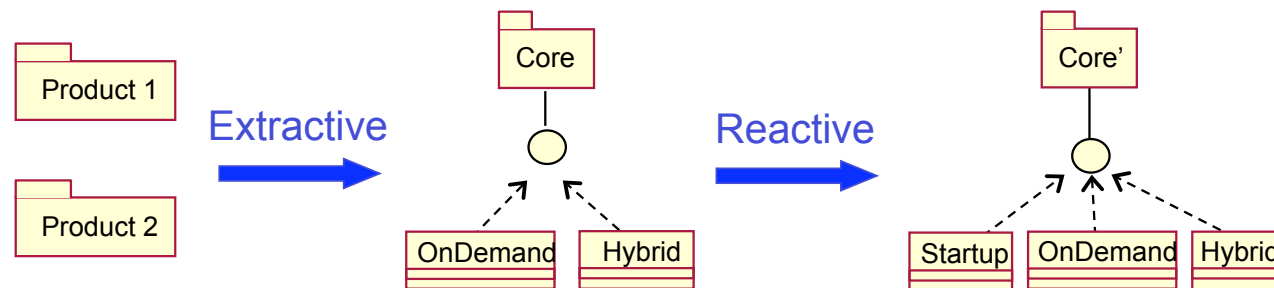


Product line development approaches

- Proativa (Big bang)
- Extrativa
- Reativa



Extractive and reactive approaches



Yet another reuse approach?

- Text reuse is not reuse!
- Class reuse
 - Failure for business concepts: Client, Account, etc.
 - Even with repositories and search mechanisms
 - OK inside a single project or for infra-structure software
- Component reuse
 - Better than class reuse due to interfaces, deployment and visibility of components
 - Similar problem with business concepts, repositories and search

Or reuse that pays?

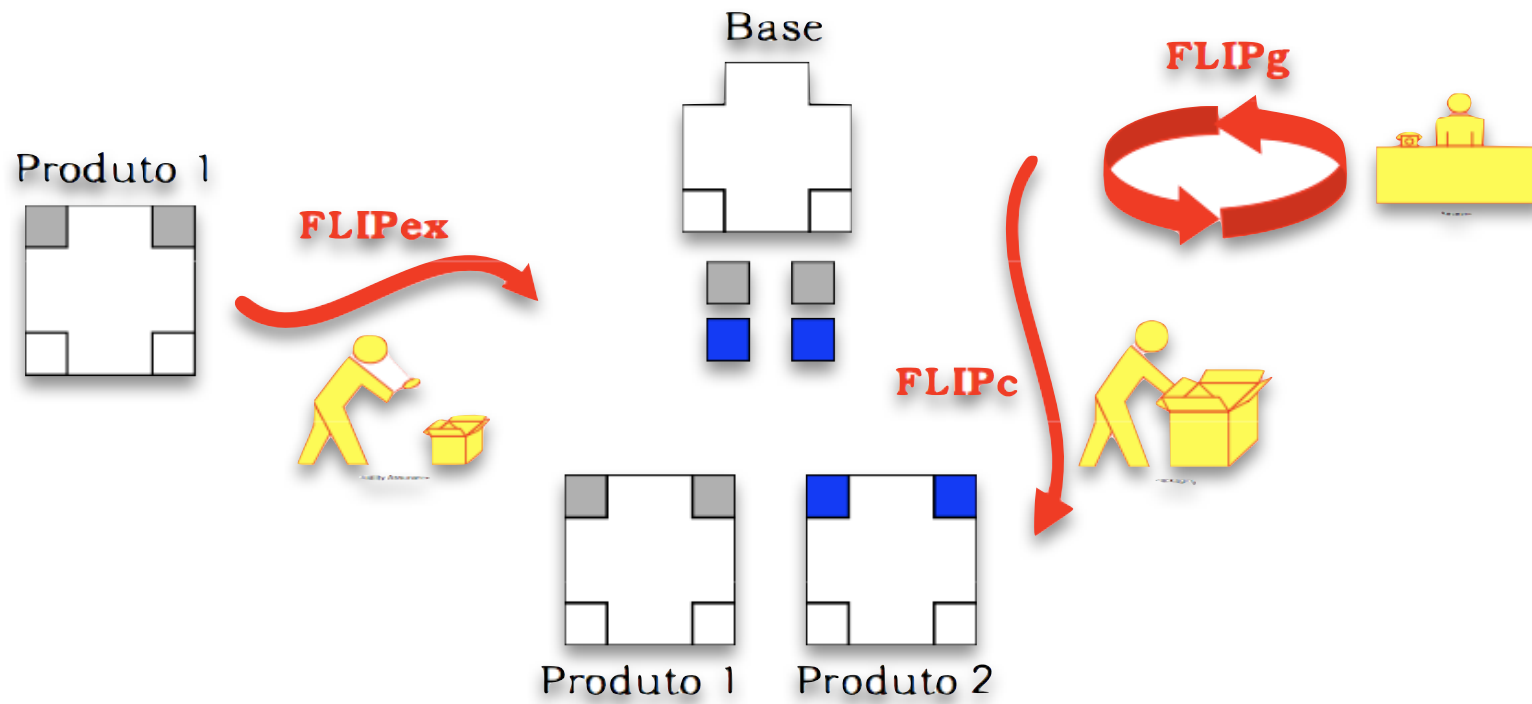
- **Services reuse**
 - Same as component reuse except for technology involved, and its non technical consequences
- **Framework reuse**
 - Class or components
 - Successful for both infra-structure (look at GUI) and business (in this case with limited flexibility)
- **Knowledge reuse**
 - Extremely successful with patterns
- **Strategic reuse**

O projeto visa...

desenvolver uma linha de produtos
a partir de uma família de produtos
existente



Ferramentas



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