17-708 SOFTWARE PRODUCT LINES: CONCEPTS AND IMPLEMENTATION

REQUIREMENTS

CHRISTIAN KAESTNER
CARNEGIE MELLON UNIVERSITY
INSTITUTE OF SOFTWARE RESEARCH

Chapter 5.1


Interview study of cloning in practice
LEARNING GOALS

Documenting requirements in domain engineering

Applying feature-based requirements definition and composition; understanding opportunities and challenges
VARIABILITY IN REQUIREMENTS
"The home security system shall be equipped with *either black and white* or *colour cameras capable of taking infrared pictures.*"
Textual Requirements

The home security system shall be equipped with...

...black and white cameras.

...colour cameras.

[...]

The video storage system shall compress colour video data by approximately 1:200.

Variability Diagram

Fig. 5-3: Orthogonal variability modelling in textual requirements
Fig. 5-8: Example of documenting variability in a tabular scenario
Fig. 5-9: Example of documenting variability in scenarios using sequence diagram notation.
Fig. 5-12: Example of documenting variability in a data flow diagram
Fig. 5-14: Example of documenting variability in a class diagram
Fig. 5-15: Example of documenting variability in a state machine diagram
FEATURE-ORIENTED REQUIREMENTS MODELING
Figure 2. The AutoSoft world model

Figure 4. BDS feature module

SPL AutoSoft
feature CC

fragment speed extends BDS{main.on}

**Figure 5.** CC feature module
SPL AutoSoft feature HC

fragment main extends CC{main.enabled.main.engaged}

CC{main.enabled.main.engaged}

main

\[
\begin{align*}
t2: & \text{override(CC\{t6\}) [slowRoadObjectAhead()]} / \\
a1: & \text{AutoSoftCar.acceleration := acceleration()}, \\
a2: & \text{CC.goalAccel := acceleration()}
\end{align*}
\]

\[
\begin{align*}
t1: & \text{SetHeadway+(o) / } \\
a1: & \text{HC.headway := o.value}
\end{align*}
\]

\[
\begin{align*}
t3: & \text{SetHeadway+(o) / } a1: \text{HC.headway := o.value}
\end{align*}
\]

Figure 6. HC feature module

Figure 7. Integrated AutoSoft behaviour model ("...") in transition labels and regions elides portions of the model.

DISCUSSION

Annotation vs Composition
Modularity, Separation of Concerns
Analysis
FURTHER READING

Klaus Pohl, Günter Böckle, Frank van der Linden. Software Product Line Engineering. Chapters 5, 10, 15. Springer 2005