Software Product Lines

Exercise 3: Compile-Time Variability with Clone-and-Own

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1. **Clone-and-Own Fundamentals**

   (a) What is clone-and-own and what are its use-cases?

   (b) A team develops a mobile app to manage school timetables. One school wants to remove weekend classes. Another school adds support for rotating weekly schedules. A third wants to show exam dates in a special tab. How could the Clone-and-Own approach be used here?

2. **Strategic Decisions in Clone-and-Own**

   A startup is building a fitness app. The first version tracks steps and calories. Later, a developer clones it to create an athlete-focused variant with features like heart rate monitoring and sleep tracking. Another team then clones the first variant to add smartwatch support. Eventually, the company plans to release a premium app that includes all features across variants — but the teams now face unexpected challenges.

   (a) Why might the developers have initially chosen the Clone-and-Own approach, even knowing its limitations?

   (b) At what point does this strategy start to create problems in the scenario above? Which problems could arise?

   (c) Would you have recommended Clone-and-Own for rapid feature prototyping if you were leading this startup in its early phase? Justify your answer.

3. **Managing Variants with Version Control Systems**

   A company creates an e-learning platform with different variants for schools, universities, and corporate training by cloning the main system. The company is currently using a version control system to manage the variants.

   (a) Explain and differentiate the terms version, revision, and variant using the example above.

   (b) How can we use version control systems to manage these different variants?

4. **Managing Variants with Build Systems**

   Consider a company developing a mobile game with different variants for casual gamers, competitive players, and premium users.

   (a) What is a build system?

   (b) In the example above, which tasks of the development process can be realized via a build system?

   (c) What steps are needed to manage and configure variants with the build systems?

5. **Version Control Systems vs. Runtime Variability**

   (a) Compare the advantages and disadvantages of using a version-control-based approach versus implementing a product line with runtime variability.

   (b) Compare the three different strategies for clone-and-own as discussed in the lecture.