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CS415 – Software Product Line Engineering – Homework 3

1.

- **Advantages**
    - Provide secure testing for features while getting user feedback
    - Remove merging problems
    - Reduce deployment risks and provides easier deployment environment
    - Make feature updating easier while feature is in production
    - Allow much more targeted testing and also allows monitoring of the use of flags.
- **Disadvantages**
    - Make the testing of whole program more difficult
    - Make maintaining and support more difficult
    - Create technical debt

2. **Categories of the Toggles**

- **Release Toggles:** It allows to seperate feature release from the production code. A developer can deploy the code of feature to production as latent code. So, tests of incomplete features can be driven by release toggles.
    - In the Online Transportation Ticket System, think that train rezervations haven't completed yet. So the components of train rezervations can be deployed as latent code by release toggle.
- **Experiment Toggles:** It allows to make data-driven optimizations by performing multivariate or A/B testing. There are cohorts for experimental toggles. Users placed in these cohorts and receive different codepaths according to their actions. In result of this, developer has chance to compare effect of different codepaths.
    - Assume there are two different cohorts. These cohorts will receive different purchase flows for their train rezervations. One cohort will receive regular flow as told in hw2 and the other one receives the flow without seat picking

options. The affect of seat picking action on purchase flow can be investigated by this experiment.

- **Ops Toggles:** When some aspects of a feature like performace, scalability, security etc. ops toggles can be used to understand behavior of that respected feature. Most Ops Toggles will be relatively short-lived.
    - Think that the developer of the ticket system is not sure from the performance of sorting algorithm he/she used in sort&filter screen. So, sorting algorithm can be ops toggles until understanding the performance of sorting.
- **Permissioning Toggles:** It allows to turn features for a set of certain users. Some features can be tested internally before deployment by configuring permissioning toggles. So bug fixings or some sort of corrections on the product can be done before deployment to production.
    - Some extra features can be designed for the business class customers of flight rezervations like extra buggage, special meal etc. So these extra features can be presented by permissioning toggles.

3. **Difference between temporary feature flags and permanent feature flags**

Temporary feature flags has limited lifetime. It is removed when the purpose of flag has done. Permanent flags are designed to understand behavior of a feature in expected aspects, so that has pretty long lifetime. In some cases it can even exist for the life of a feature.

Release toggles are typical type of a temporary feature flag. Developer can deploy the codepath as latent code for some testing purposes and when it fulfills its business purpose, developer can move it to production or remove from the program. It is meaningles to have latent code permanently in the program.

Experiment toggles are also example of a temporary feature flag. Already it is necessary for data-driven optimization via A/B testing. It has to be removed when the testing is over. Longer is unlikely to be useful, as other changes to the system risk invalidating the results of the experiment.

Ops Toggles can both be temporary and permanent flag according to its purpose. Ops Toggles are used to control operational aspects of our system's behavior. It has to be

removed when the confidence is gained in the operational aspects of a new feature. Ops Toggles are mostly temporary flags but if the purpose of it needs long-term investigation, it can considered as a permanent flag.

Permissioning Toggles are permanent flags because permissions are user specific and it can stay for multiple years for a user category.

4. Anatomy of a Feature Flag

Feature flags consist of four main components. These are toggle point, toggle router, toggle context and toggle configuration. Toggle points are needed for on/off activities of the features. A toggle router maps the toggle points to the state of the feature flag. This is needed for knowledge to state of the feature across many toggle points. Toggle context is the body of the feature flag. Toggle router receives it for computing the feature's state. Lastly, toggle configurations can be used as alternative to obtain and control results of toggle router. It can be switched off manually.