Branching Strategies

Usage of Branching Strategies within Software Development

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Agenda

1. Arguments against Branching
2. Without Branches
3. When do we really need Branches?
4. Why Branching Concepts?
5. Branching Concepts
6. Recipes for successful Branching/Merging
7. Pitfalls of Branching
1. Arguments against Branching

- We have a small project, so we don't need that.
- To complicated.
- There is no benefit on using Branching.
- We have already a Branching strategy ;-)  
- What about conflicts?
- ..
2. Without Branches

- Let us make an experiment:
  - We assume to have a Version Control Tool (VCT) which does **not** support the concept of branching.
  - So we have **no branches at all**.
2. Without Branches

- This means we have only a single line of development.
- Let us think in Subversion terms „trunk“ for simplicity.
- Every developer has to commit on the same line.
2. Without Branches

Consequences

- What are the Consequences of the given scenario?
  - The environment for every developer is changing by every commit.
  - Code is not stabilizing
  - Release time points are problematic.

- Mixture of code ready-for-production, bug fixing and feature implementation.
2. Without Branches

Consequences

- The environment for every developer is changed by every commit.
  - This will leading to a commit policy:
    - Only commit if change has been ready
  - Prevent from commits!
2. Without Branches

Consequences

- Complex relationship between code changes and requirement/change management.
- This will make undoing of any changes more or less impossible.
- Defect analysis can be very complex.
2. Without Branches Consequences

- Developers can not work on a Feature/Bug parallel.
- They will not synchronize with the repository, cause this can break their current work.
  - They have to solve conflicts instead of working on Features or Bugs.
2. Without Branches

Consequences

- **Release Preparation:**
  - *Stop development!*
  - Only Bug Fixing for Release is allowed
  - No parallel development possible
  - Code fixes to turn off non ready code.

Commit developer 1
Commit developer 2
Commit developer 1
2. When do we really need Branches?

- We made an release (REL 1.0) and the customer is calling that a bug has been found.
  - We have to fix that bug as soon as possible and deliver a new release to the customer.
3. When do we really need Branches?

- If we have a VCT which does not support the concept of branches (independent how it is called) we are really in trouble.

Note:
RCS already supports branching (1985!)
3. When do we really need Branches?

- In real life we are using Subversion ;-)  
  - We would create a Branch and do the Bug fixing on it.  
  - This Branch is called a Hot-Fix or Bug-Fix Branch.
4. Branching Concepts

Why?

• Why using Branching Concepts?
  – Change/Defect Management
  – Project/Release planning
    • Test, Integration Test, Q&A
  – Versions for:
    • Cross compiling, Operation System, GUI / Hardware.
4. Branching Concepts

Why?

- Why using Branching Concepts?
  - Get a better relationship between Change/Defect Management and the changes made to the software.
  - Better informations for you and of course for the customers.
4. Branching Concepts

Why?

• Why using Branching Concepts?
  – Project/Release planning
    • Better identification of thinks which are coming into a release/milestone etc.
    • You can control what exactly is going into a particular release/milestone.
    • You can control the time when it's integrated into the release/milestone.
4. Branching Concepts

Why?

• Why using Branching Concepts?
  – Cross compiling, Operation System, GUI / Hardware.
    • You can create Branches for particular operation systems
    • Hardware
    • GUI
    • etc.
5. Branching Concepts

Bug-Fix Branching

- We create the Bug-Fix Branch based on the Release 1.0
5. Branching Concepts

Bug-Fix Branching

• Advantages:
  – Development (trunk) and bug fixing line are separated.
  – Separated deployment/delivery from development. So the fixed released can be delivered very fast to the customer.
5. Branching Concepts
Bug-Fix Branching

• Disadvantages:
  – The trunk is of course unstable yet.
5. Branching Concepts

Release Branching

- We define a point in time to start with the Release Branch as a preparation for a particular release (Feature Freeze).
5. Branching Concepts

Release Branching

• Advantages:
  
  – Development (trunk) and release line are separated. There is no need to stop development on trunk.
  
  – Changes on the release line only affecting the release not the current development and vice versa.
  
  – Separated deployment/delivery from development.
5. Branching Concepts

Release Branching

• Disadvantages:
  – The trunk is unstable
    • Mixture of Bug-Fixes / Features / Enhancements etc.
  – No good relationship between Change/Defect Management on the release line.
  – Undoing changes is not very simple.
5. Branching Concepts
Release Branching

- Don't miss to merge the changes back into the development line ;-)

![Diagram showing branching concepts]

- trunk
- RB_RELEASE-1.0
- RELEASE_1.0.0
- 1 2 3 4 5 6 10
5. Branching Concepts

Issue Branching I

- Create a Branch for issues for example Bugs, Changes etc.
5. Branching Concepts

Issue Branching I

• Advantages:
  – Exact association between Code changes and Change/Defect Management for the created branches
  – Undoing of changes will be simplified on the “trunk”.

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5. Branching Concepts

Issue Branching I

• Disadvantages:
  – Unstable trunk
  – No good relationship to Change/Defect Management for the trunk.
5. Branching Concepts
Issue Branching II

- Changes/Bug Fixes will be made by Branches only.
5. Branching Concepts
Issue Branching II

● Advantages

– Very good relationship between Change/Defect Management either on the branches and what has been integrated into the “trunk”.

– Analysing is simplified cause the problem can only occur at the integration point.

– Simplifies undoing of changes.
5. Branching Concepts

Issue Branching II

- Disadvantages
  - You have to be careful with code refactoring, cause changes in folder structure can be a nightmare during a merge.
5. Branching Concepts
Integration/Dev Line

- Integration / Development Line
- The Integration line is sometimes called the Release line.
5. Branching Concepts Integration/Dev Line

• Advantages
  – Separated development/deployment.
  – Parallel development and release line.
5. Branching Concepts
Integration/Dev Line

• Disadvantages
  – Code stabilizing is not very good, cause you are integrating from an unstable code line „trunk“
  – Loosing relationship to Change/Defect Management
5. Branching Concepts Baselining

- Serialized Releases

Diagram:
- Baseline
- Rel 1.0.0
- Rel 1.1.0
- CI/Testing
- B_1
- B_2
- B_3
- B_4
- B_5
- B_6
- At least Unit Testing

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5. Branching Concepts Baselining

- With reintegration into Baseline from time to time.
5. Branching Concepts Baselining

Integration Line R1.1
Integration Line R1.0
Integration Line R2.0

Baseline 1
Baseline 2

trunk

B_1
B_2
B_3

B_4
B_5
B_6
5. Branching Concepts

Baselining

• Advantages
  – Exact association between change/defect Management and the branches
  – Stabilized Code line
5. Branching Concepts Baselining

• Disadvantages
  – May be problematic if code refactoring is needed.
  – Sometimes problems occur if branches depend on each other.
6. Recipes for successful Branching/Merging

- Before you think about a Branching concept, think about a **Merging** concept instead.
  - Who should do the merge?
    - The developers.
6. Recipes for successful Branching/Merging

- What should be part of the merging process?
  - Unit Tests
  - Integration Test
  - System Test
  - Continuous Integration (CI) which is triggered by commits can be a good support on the integration lines.
6. Recipes for successful Branching/Merging

- Think about your branching concept before project start. These concepts are part of the project planning phase.
- Do not write your branch concept in stone!
- Observe your experience with your branching concept and......
  - If it is necessary just change it!
6. Recipes for successful Branching/Merging

- Naming Conventions for branch names.
  - Very important

  **Write it down instead of just thinking about it!**
6. Recipes for successful Branching/Merging

● Naming Conventions for Branches:
  - Integration Line (IL_...)
    • Release number as supplemental (IL_RELEASE-1.0.0)
  - Bug Fix Branches (BFB_...)
    • Bug tracker id should appended (BFB_TICKET31)
6. Recipes for successful Branching/Merging

• Naming Conventions for Branches:
  - Feature Branches (FB...) (FB_TICKET66)
  - If you have different tools for Change Management and Bug Tracking, add the information too.
    • For example FB_CMTICKET42
6. Recipes for successful Branching/Merging

• In Subversion...
  – Create sub folders in the branches directory
    • integration, bugfixes, features
  – May be for the tags folders is needed the same
    • Build Tags etc.
6. Recipes for successful Branching/Merging

• My final Statement:

   **No Unit Tests No Branching!**

• But the better Statement is:

   **No Unit Tests No Merging!**
7. Pitfalls of Branching

- Not merged for a long time.
  - This can result in many conflicts during a following merge.
    - Reduce branch life time
    - Make reintegrations from time to time.
    - Change your Branching Concept
7. Pitfalls of Branching

- Branch-oholic
  - Branch at all costs.
  - May be you have not invested enough effort into a „Branching/Merging Concept“ (Software Configuration Plan).
On-line Sources I

• [1] Brad Appleton's Streamed Lines: Branching Patterns for Parallel Software Development
  - http://cmcrossroads.com/bradapp/acme

• [2] UCM Branching Strategies
  - http://www.snuffybear.com/ucm_branch.htm

• [3] Branching and Merging Primer
On-line Sources II

- [4] Branching Strategy Questioned


  - http://www.infoq.com/articles/dvcs-guide
On-line Sources III

- [7] Homepage of Subversion
  - http://subversion.tigris.org

- [8] Book about Subversion
  - http://www.svnbook.org

- [9] Subversion Forum
  - http://www.svnforum.org

- [10] German Subversion forum
  - http://forum.subversionbuch.de
On-line Sources II

  – http://www.xing.com/net/skm

• [12] The SKM Wiki (german)
  – http://www.skmwiki.de
Questions?

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- Thank you for your attention.