Lustre Development

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Lustre Group - Lead Engineer

Strategy

- Believable Roadmap
  - > HEAD to Good
  - > Interoperability
  - > Userspace servers / ZFS
  - > CMD
- Quality
  - > Improve design and development processes
    - – Branch management
    - – Design and Coding
  - > Improve our understanding
    - – Benchmarking
    - – Subsystem map

Branch Management

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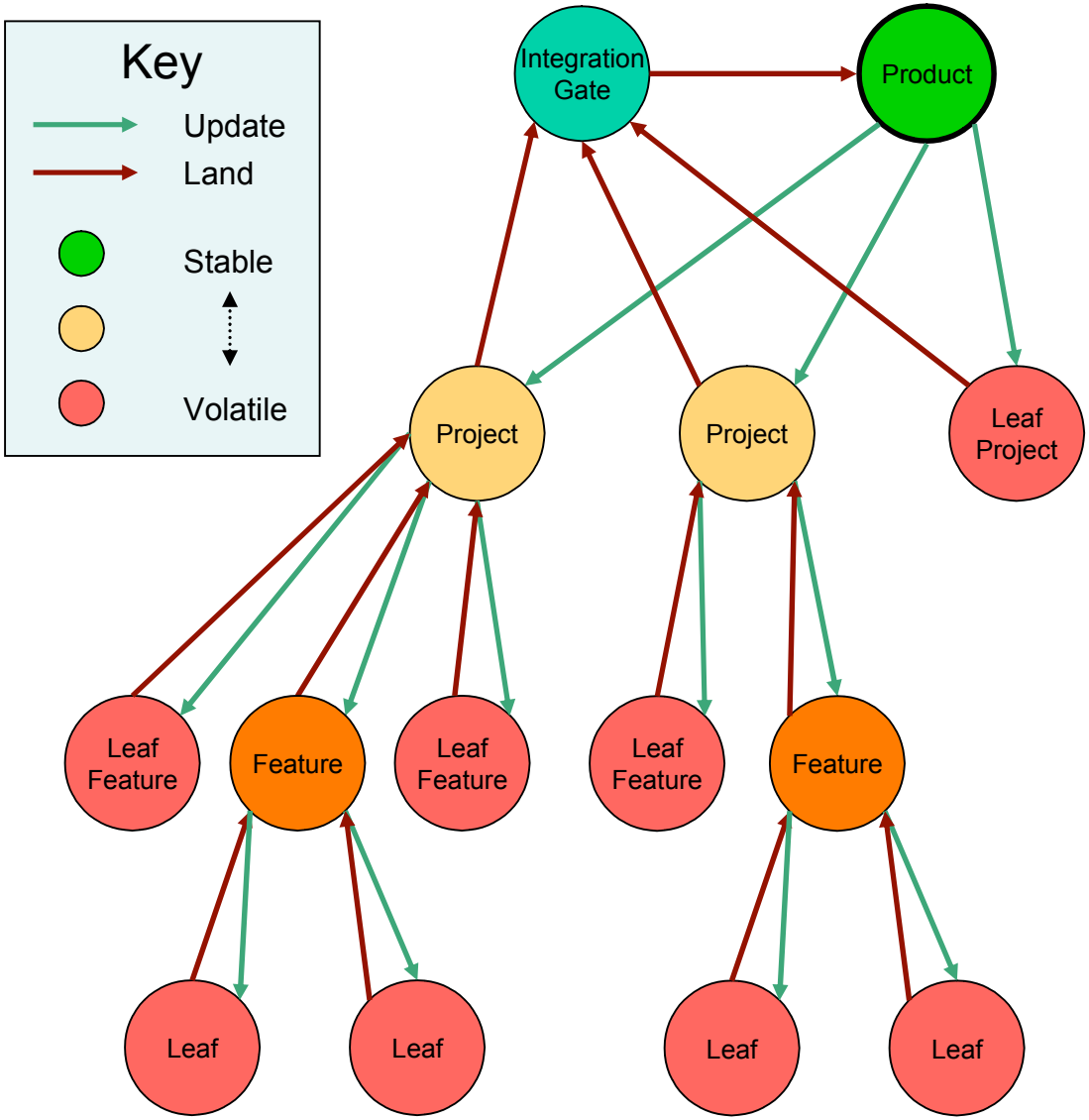
Branch Management



- Stable Product Branch
  - > No landings without integration testing
- Develop on Leaf Branches
  - > Frequent commits for backup history and visibility
  - > Developers may share leaf branches (but live in each other's pockets).
- Frequent updates
  - > Up-to-date context for development
  - > Spread the pain
- No landing without testing
  - > Pre-integration tests required before landing on gate
  - > Integration tests required before landing on product

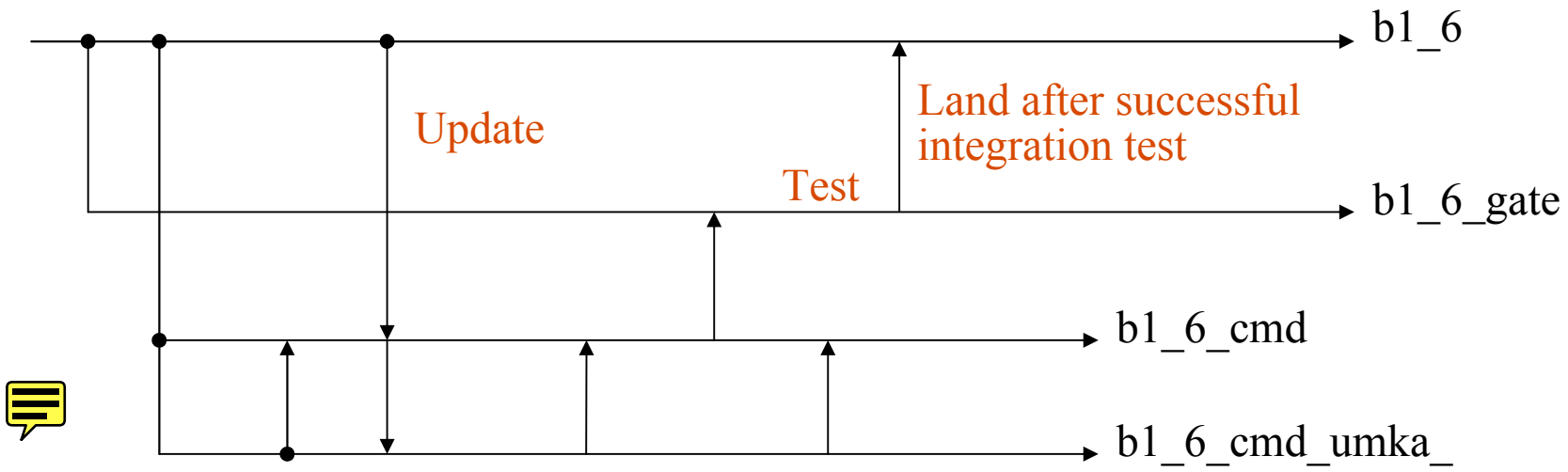
Branch Management – Naming

- Branches naming scheme:
  - b*major_minor*
  - b*major_minor*_gate
  - b*major_minor_project*[_*feature*[_*developer*]]
  - b*major_minor*_bug*12345*
  - b*major_minor*_bugs
- Examples:
  - b1_6
  - b1_6_gate
  - b1_6_bugs
  - b1_6_cmd
  - b1_6_cmd_umka
  - b1_6_bug12345

Branch Management – Creation

- Product (including gate & minor bug branches)
  - > Only with permission of PMO
- Direct child of product branch
  - > Only with permission of PMO
  - > Major bugs
  - > Development projects and features
    - – Branch plan must be included in project plan
- Indirect children of product branch
  - > Only with permission of parent branch owner
- Wiki branch table

Branch Management – Landing



- Only gate may land on product branch
  - > Only after successful integration test
- Only direct children of product branch may land on gate
  - > Only with permission of gatekeeper

Branch Management – Gate Landing Policy

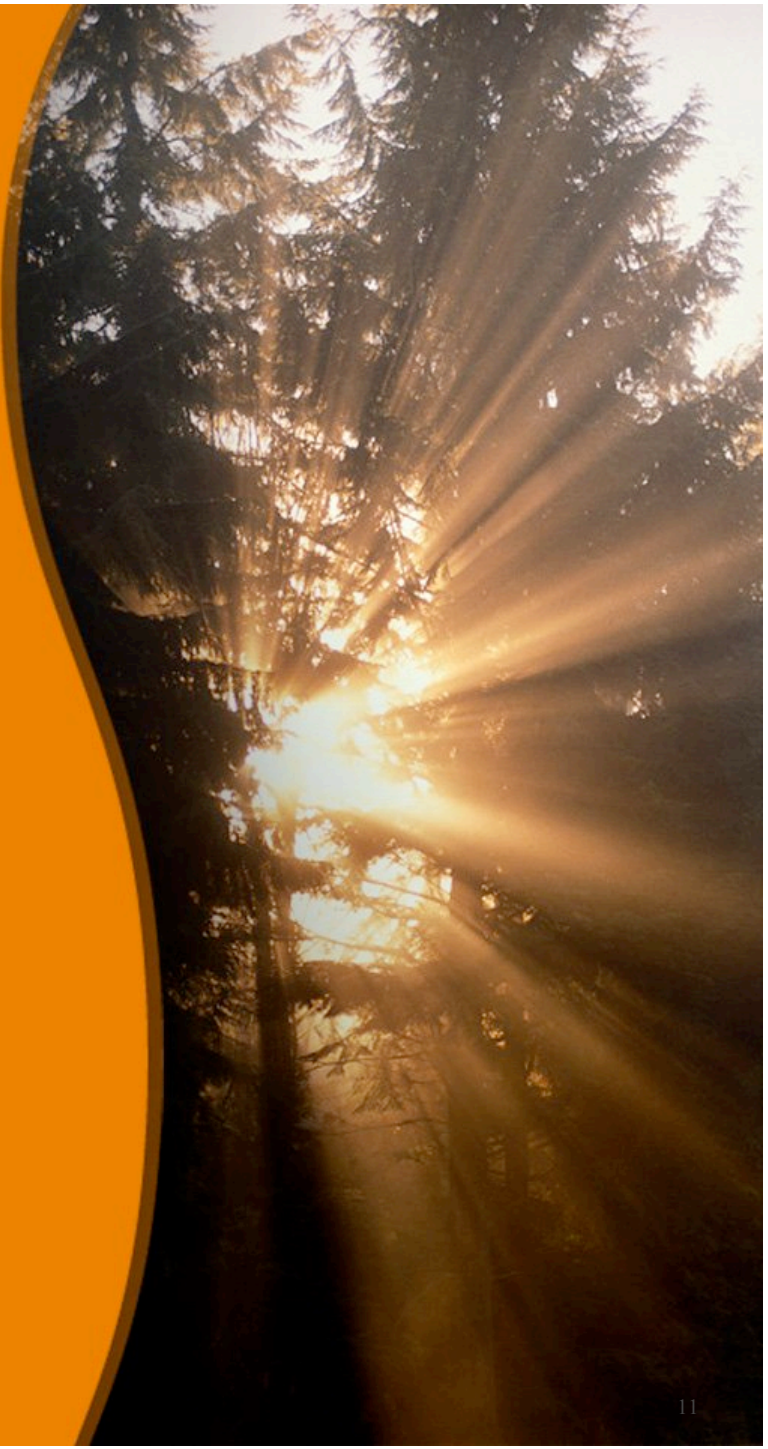
- Code must have been inspected
  - At least 1 inspector must be a senior engineer
- Code must have been tested
  - According to feature/project test plan
- Gatekeeper must have granted permission
  - Request via associated bug
  - Associated bug must block gate bug
- Minor bugs stay as patches to the ‘bugs’ branch
  - Commit patch directly to gate when above conditions satisfied

Branch Management – Integration Testing

- QE runs integration tests
  - Gatekeeper determines what tests to run
- On Success…
  - Update all product branch children
- On failure
  - Diagnose, back out relevant gate landings, retest
  - …or…
  - Back out all gate landings
  - Require branch/bug owners to retest/resubmit

Branch Management – What are we working on now?

- Creation of the _gate and _bugs branches for HEAD and all existing product branches
- Updates to the land[12].sh scripts to accommodate the new gate branch
- Letting people know about the new release structure and asking for their assistance in making this transition happen smoothly.
- Getting feedback from you on things which may be unclear or that we could do better.



Process

Process – Goals

- Estimate as accurately as possible
- Minimize defects
  - Prevent defects entering the development process
  - Catch defects as early as possible
  - Catch as many defects as possible
- Learn and improve
  - Planners
  - Designers
  - Coders
  - Inspectors

Process – Ask!

- Ask!
  - If you think it's pointless
  - If you think something is missing
  - If you don't quite see how it fits together
  - If you think you missed something
  - If you don't know
  - If you have any doubt
  - If you feel unsure

Process – Ask!

- It takes courage to ask
  - > especially if you're unsure
  - > especially if you think other people know
  - > especially if you feel foolish

- You'll feel much better after you've asked!
  - > You might have found an omission or a defect
  - > You will have learnt something

Process – Steps

- Process steps up to landing on the gate
  - Architectural requirements, inspection, plan
  - HLD, inspection, replan
  - Coding launch meeting
  - DLD, inspection, replan
  - Coding, unit test, inspection
- Everything recorded
  - All plans
  - All inspections including defect count
- We get to know “How are we doing?”
  - Progress
  - Defects
  - Estimates

Process – Inspection

- The output from an inspection is a text file listing the following on the first 6 lines
  - > Total defect count (number first)
  - > Size of thing inspected (lines, number first)
  - > Person who's work was inspected
  - > Inspector
  - > What was inspected
  - > Date
- Numbered list of defects with a short description of each one. Use a blank line between each defect.
- Separate list of suggestions. Use a blank line between each suggestion.

Process: Inspection

- A single *defect* is any single (or systematic) error or omission that prevents the inspected work meeting its requirements
  - Architecture: missing requirement
  - HLD: faulty logic, missing functionality
  - Code: program error, unacceptable unreadability
- Defects must be fixed
- Suggestions are for guidance
  - Improve code style
  - Improve readability
  - Not absolutely required to be followed, but they're not there for nothing.

Process – Inspection Example

2 defects
200 LOC
Someone
Eric Barton
{u,k}ptllnd alignment bug CODE
06/11/28

Defects

1. In ptllnd_rx_buffer_callback(), when the incoming message is misaligned, first check ev->mlength before blindly copying the payload into rx_space. If the message is too long you must force a protocol error.

2. In the userspace LND it's wrong simply to assert that the incoming message is aligned – a buggy peer will crash you.

Suggestions

Take care where you handle defect 1 in case returning a protocol error makes the caller drop the connection in interrupt context.

Process – Architecture

- Every HLD needs a current architectural requirements document with a complete list of high-level requirements
- Check with project management *before* starting an HLD…
  - > Does the architecture document exist?
  - > Is it current?
  - > Has it passed inspection?

Process – HLD

- HLD writers must be qualified
  - > Senior Engineer
  - > Subsystem owner/deputy
  - > Training exercise – under guidance
- HLD inspectors

  - > Peter Braam & Eric Barton
  - > Mentoring most senior engineers
  - > Develop HLD inspection checklist
- Start from the HLD template
  - > Being revised now
  - > Use HLD inspection checklist
- HLD must include a test plan

Process – Coding Launch Meeting

- HLD writer + HLD inspector + coder
- Coder must convince HLD writer and inspector s/he understands the architectural requirements and the HLD

- Good preparation + questions essential
- Record time/date of meeting + attendees in bug

Process – DLD

- Skeleton code in-context
  - > Complete structure definitions
  - > Major procedures
    - – Prototypes including parameter lists
    - – Definitions in-place
    - – Body containing comments + code fragments
    - – All non-trivial functionality and state machines described
- Attach patch + CVS tag to bug
  - > Doesn’t have to compile
  - > Must apply cleanly

Questions?