Implementation

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Top-down Integration

If code artifact *mAbove* sends a message to artifact *mBelow*, then *mAbove* is implemented and integrated before *mBelow*.

- a, b, c, d, e, f, g, h, i, j, k, l, m (BFS order)

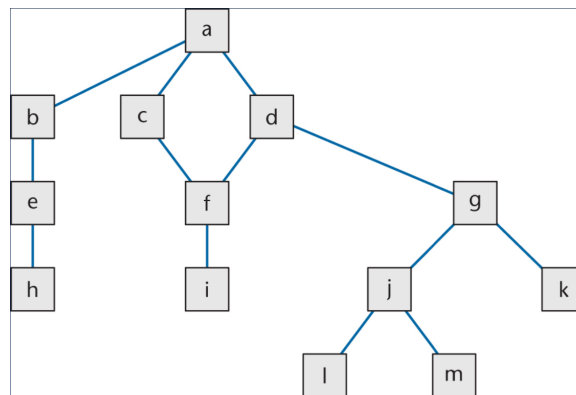- a, b, e, h, c, d, f, i, g, j, k, l, m (Roughly DFS order)

Figure 1: Artifacts Structure

Advantage

- **Fault isolation**

  If a previously successful test case fails when *mNew* is added to what has been tested so far. The fault must lie in *mNew* or the interface(s) between *mNew* and the rest of the product.

- **Stubs are not wasted**

  Each stub is expanded into the corresponding complete artifact at the appropriate step.

- **Major design flaws show up early**

  Logic artifacts include the decision-making flow of control. Operational artifacts perform the actual operations of the product. The logic artifacts are developed before the operational artifacts.

Disadvantage

- Reusable artifacts are not properly tested. Lower level (operational) artifacts are not tested frequently.

Bottom-up Integration

If code artifact *mAbove* sends a message to artifact *mBelow*, then *mBelow* is implemented and integrated before *mAbove*.

- l, m, h, i, j, k, e, f, g, b, c, d, a

- h, e, b, i, f, c, l, m, j, k, g, d, a

Advantage

- Operational artifacts are thoroughly tested.

- Operational artifacts are tested with drivers, not by fault shielding, defensively programmed artifacts.

- Fault isolation.

Disadvantage

- Major design faults are detected late.

Sandwich Integration

Combine top-down and bottom-up strategies making use of their strengths and minimizing their weaknesses. In Sandwich Integration, logic artifacts are integrated top-down. Operational artifacts are integrated bottom-up. Finally, the interfaces between the two groups are tested.
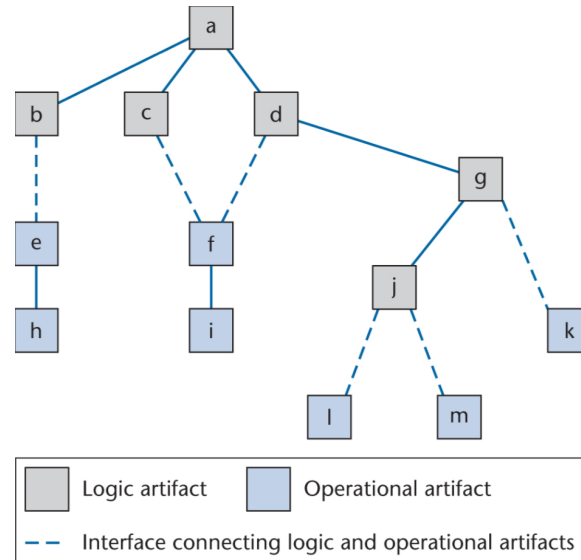
Figure 2: Sandwich Integration

Advantage

- Major design faults are caught early

- Operational artifacts are thoroughly tested.

- Fault isolation.