Test Automation System Architecture End-to-End Flow: Development → Testing → Production «actors» **ACTORS & TRIGGERS** 3. Execute tests QA Lead CI/CD System Developer 2. Create test data «actors» **USER INTERFACES** «ui» «ui» Run Orchestrator Test Data Studio ############ ########### Create & manage test data Execute test suites Monitor & report results Auto-tag: env + feature + release 6. API calls 5. API calls «actors» **SERVICE LAYER** .Push code 4. Trigger pipeline «api» «api» Run Orchestrator API Data Studio API ############# ############ Test execution API RESTful API 7. Deploy request **CRUD** operations Result management . Auto-tag PHASE 1.5: RELEASE TAGGING # Duration: 30 min - 1 hour «actors» Location: All ST DBs ORCHESTRATION & MUTOMATION ############################## Triggered by: Merge to release branch «tagging» Process: Release Tagging Service # «cicd» ① Scan all ST databases ########### CI/CD Pipeline ② Identify untagged data Auto-tag at creation ############ ③ Correct mis-tagged records 4 Apply release tag "R2" • Pre-consolidation validation Deploy to all environments • Generate release manifest Trigger automation services 5 Generate manifest: 12. Write test data QA approval gate • ST-1: 150 records 11. Trigger tests • ST-2: 200 records • ST-N: 75 records © QA reviews & approves Lock data for consolidation Output: Validated, locked datasets 13. Validate & tag 10. Deploy to ST **PHASE 1: FEATURE TESTING** Duration: 1-2 weeks 9 Deploy to Dev Location: Cloud (Dev/ST) CLOUD LAYER (Dev & System Test) ##################################### Flow: Fast Iteration | Isolated Testing | Multiple Environments ① Dev pushes code 2 CI/CD deploys to Dev 3 QA creates test data in Studio Auto-tagged: env + feature + release «env» ST Databases «env» Test Simulator ########### ⑤ Deploy to ST environments Development ########### ® Simulator runs tests • Release-tagged data Environment ⑦ Results → Test Mgmt Tool ⑧ Feature approved & merged Automated test execution • Feature-specific • Environment-specific 14. Release manifest Deploy to ST-N Deploy to ST-2 **Test Data Tags:** • environment: "ST-1" Run tests • feature: "FEAT-123" Run tests • release: "R2" • tagged_at: timestamp Run tests tagged_by: user 15. Export tagged data Object Storage (S3) «env» «env» «env» ########### ST-2 **Exported test data** Release manifest 16. Process data PHASE 2: DATA CONSOLIDATION «actors» Duration: 4-8 hours DATA CONSOLIDATION ZONE **Location:** Cloud → On-Prem #################################### 22. Test results **Conflict Resolution:** «consolidation» Duplicate IDs **Data Consolidation Service** Email collisions ######################### Reference violations Step 1: Export ST DBs → S3 Business key conflicts Step 2: Transfer S3 → Staging DB Step 3: Detect conflicts (IDs, emails, refs) Resolution Strategy: Step 4: Auto-resolve 70-80% R2 data supersedes R1 Step 5: Manual review 20-30% • Auto-resolve: 70-80% Step 6: Validate & promote to Master • Manual review: 20-30% Release tags guide priority Data States: Exported → Staged → Validated → Active 23. Metadata sync 19. Deploy to PreProd **PHASE 3: RELEASE TESTING** Duration: 1-2 days Location: On-Prem PreProd ON-PREMISES LAYER (PreProd & Production) Smoke Tests: «actors» Production Stability | Consolidated Data | Single Source of Truth • Release-specific data (R2) EXTERNAL SYSTEMS • Duration: 30-120 min **Regression Tests:** 17. Load & detect conflicts • Cumulative data (R1+R2+...) «env» Staging DB • Duration: 4-8 hours Test Management Tool ########### ############ • Overnight execution **Conflict detection** Test cases & results Temporary holding #################################### Traceability matrix Validation zone **PHASE 4: PRODUCTION DEPLOY** Duration: ~1 day Location: On-Prem Production ################################ ① Final approvals 2 Deploy to Production ③ Critical smoke (15-30 min) Enable monitoring ⑤ Data stays active (R2 tagged) 18. Promote validated data **MASTER DATABASE FEATURES** ############################### Characteristics: Single source of truth Release-versioned records • Cumulative test sets • Snapshot per release Query Capabilities: "All R2 tests" • "R1 + R2 + R3 cumulative" Master DB • Release-specific selection ############ Historical snapshots Authoritative source Release-versioned Data States: Cumulative test sets Active → Archived → Versioned Snapshot per release #################################### **PHASE 5: CONTINUOUS GROWTH** Duration: Ongoing • Nightly regression (full suite) • Coverage grows per release 20. Test data source • No functionality untested • Audit trail maintained «env» PreProd Environment 21. Approved → Deploy «env» Production Environment **COMPONENT TYPES** ############################## <#DBEAFE> User Interface </#> | QA-facing applications <#E9D5FF> Service API </#> | REST APIs <#FEF3C7> CI/CD Pipeline </#> | Deployment automation <#D1FAE5> Release Tagging # </#> | NEW: Tag management <#FECDD3> Consolidation </#> | Data merging service <#EFF6FF> Cloud Zone </#> | Fast iteration environments <#FEF2F2> On-Prem Zone </#> | Production environments **KEY CONCEPTS** ############################# Tag Structure: env + feature + release **Data Flow:** ST DB → S3 → Staging → Master Conflict Resolution: 70-80% auto, 20-30% manual Test Strategy: Cumulative regression (R1+R2+R3+...)