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# 🧪 Testing Documentation

## Test Specification

### **📋 Complete Test Coverage: 25 Scenarios (~90% Coverage)**

→ [**TEST\_SCENARIOS\_COMPLETE.md**](TEST_SCENARIOS_COMPLETE.md) ⭐ Main test specification

This includes: - **10 Core Scenarios** (common patterns from Business Analysis) - **15 Edge Cases** (data quality, timing, boundaries) - **Total: 25 test cases** covering 90%+ of real-world scenarios

## 📋 Test Cases Overview

### **Core Scenarios (TC-001 to TC-010)**

| **Test Case** | **Scenario** | **Priority** | **Coverage** |
| --- | --- | --- | --- |
| TC-001 | Perfect Viewing | P0 | Happy path |
| TC-002 | Pause & Resume | P0 | Common pattern |
| TC-003 | Browser Close | P0 | Data loss |
| TC-004 | Skip Forward | P1 | Navigation |
| TC-005 | Skip Backward (Rewind) | P1 | Navigation |
| TC-006 | Multiple Sessions | P1 | Replay |
| TC-007 | Multi-Video Session | P1 | Binge watching |
| TC-008 | Abandoned Early | P2 | Low engagement |
| TC-009 | Complex Navigation | P2 | Multiple interactions |
| TC-010 | Gaming Detection | P1 | Data quality |

### **Edge Cases (TC-011 to TC-025)**

| **Test Case** | **Scenario** | **Priority** | **Category** |
| --- | --- | --- | --- |
| TC-011 | Duplicate Events | P1 | Data Quality |
| TC-012 | Out-of-Order Events | P1 | Data Quality |
| TC-013 | Null/Missing Values | P0 | Data Quality |
| TC-014 | Negative currentTime | P1 | Data Quality |
| TC-015 | Extremely Long Watch | P1 | Data Quality |
| TC-016 | Rapid Fire Events | P2 | Timing |
| TC-017 | Session Timeout | P2 | Timing |
| TC-018 | Same Day Multiple Sessions | P2 | Timing |
| TC-019 | Midnight Boundary | P2 | Timing |
| TC-020 | Position Beyond Duration | P1 | Boundary |
| TC-021 | Zero Duration Segment | P2 | Boundary |
| TC-022 | Only Resume Events | P2 | Boundary |
| TC-023 | Only Pause Events | P2 | Boundary |
| TC-024 | Empty Session | P2 | Boundary |
| TC-025 | Multiple Play Events | P2 | Data Quality |

## 🎯 For Testers

### 1. Read the Complete Test Specification

**→** [**TEST\_SCENARIOS\_COMPLETE.md**](TEST_SCENARIOS_COMPLETE.md) (2 hours)

All 25 scenarios with: - ✅ Description of behavior - ✅ Raw input events (test data) - ✅ Expected output metrics - ✅ Validation criteria - ✅ Priority levels (P0/P1/P2)

**Also reference:** **→** [**Video Tracking Scenarios Guide**](../02_BUSINESS_ANALYSIS/VIDEO_TRACKING_SCENARIOS_GUIDE.md) - Business context for core scenarios

### 2. Generate Test Data

**→** [**test\_data\_generator\_complete.py**](test_data_generator_complete.py) ⭐ NEW

Complete test data generator for ALL 25 scenarios in one notebook.

### 3. Run Validation Queries

Use the validation queries in the Scenarios Guide (see “Testing Scenarios” section).

### 4. Create Test Report

Template:

Test Report - Video Analytics Aggregation  
  
Date: [Date]  
Tester: [Name]  
Environment: [Dev/Test/Prod]  
  
Test Results:  
- TC-001: ✅ PASS  
- TC-002: ✅ PASS  
- TC-003: ✅ PASS  
- TC-004: ✅ PASS  
- TC-005: ✅ PASS  
- TC-006: ✅ PASS  
- TC-007: ✅ PASS  
- TC-008: ✅ PASS  
- TC-009: ✅ PASS  
- TC-010: ✅ PASS  
  
Overall: 10/10 PASS  
  
Issues Found: [None / List issues]  
Sign-off: [Name, Date]

## 🔍 Sample Validation Queries

### Test 1: Verify No Negative Watch Time

SELECT \* FROM aggregated\_user\_video\_engagement  
WHERE totalWatchTime < 0;  
-- Expected: 0 rows

### Test 2: Watch Percentage in Valid Range

SELECT \* FROM aggregated\_user\_video\_engagement  
WHERE watchPercentage > 200;  
-- Expected: 0 or very few rows (over 200% is suspicious)

### Test 3: Completion Requires Sufficient Watch

SELECT \* FROM aggregated\_user\_video\_engagement  
WHERE completed = true  
 AND watchPercentage < 50  
 AND dataQualityFlag = 'ok';  
-- Expected: 0 rows (all should be flagged)

### Test 4: Max Position ≤ Video Duration

SELECT \* FROM aggregated\_user\_video\_engagement  
WHERE maxPositionReached > videoDuration;  
-- Expected: 0 rows

### Test 5: Session Count ≥ 1

SELECT \* FROM aggregated\_user\_video\_engagement  
WHERE sessionCount < 1;  
-- Expected: 0 rows

## ✅ Test Checklist

### Pre-Testing:

* Read Video Tracking Scenarios Guide (all 10 scenarios)
* Understand expected behavior for each scenario
* Setup test environment
* Generate test data using example notebook

### During Testing:

* Run aggregation script
* Execute validation queries
* Compare output with expected results from guide
* Document any discrepancies
* Test edge cases

### Post-Testing:

* All 10 scenarios pass
* Data quality checks pass
* Performance acceptable (see benchmarks)
* Create test report
* Get BA sign-off

## 🐛 Common Issues & How to Test

### Issue 1: Browser Close Data Loss

**Test:** Scenario 3 (Browser Close) **Expected:** Only counts completed segments **Validation:** Check that totalWatchTime is less than actual time if browser closed

### Issue 2: Skip Detection

**Test:** Scenario 4 (Skip Forward) & Scenario 5 (Rewind) **Expected:** forwardSkipCount or backwardSkipCount > 0 **Validation:** Check skip counts match expected jumps

### Issue 3: Multiple Session Aggregation

**Test:** Scenario 6 (Multiple Sessions) **Expected:** sessionCount > 1, aggregates across sessions **Validation:** Sum of session watch times = totalWatchTime

### Issue 4: Gaming Detection

**Test:** Scenario 10 (Skip to End) **Expected:** dataQualityFlag = ‘completed\_without\_sufficient\_watch’ **Validation:** Flag raised when completed but watchPercentage < 75%

## 📊 Test Metrics

Track these metrics during testing:

| **Metric** | **Target** | **How to Measure** |
| --- | --- | --- |
| Test Coverage | 10/10 scenarios | Count passing test cases |
| Data Quality | >95% “ok” flag | Count quality flags |
| Performance | <5 sec for 1M events | Time aggregation run |
| Accuracy | 100% match expected output | Compare with scenarios |

## 🆘 Need Help?

1. **For test specification:** See [Video Tracking Scenarios Guide](../02_BUSINESS_ANALYSIS/VIDEO_TRACKING_SCENARIOS_GUIDE.md)
2. **For test data:** See [Example Notebook](../03_DEVELOPMENT/databricks_example_notebook.py)
3. **For expected behavior:** Each scenario in the guide shows expected output
4. **For technical issues:** See [Quick Reference Guide](../05_REFERENCE/quick_reference_guide.md)

## 🎯 Success Criteria

Testing is complete when:

✅ All 10 scenarios pass with expected output

✅ Data quality validation queries return 0 problematic rows

✅ Performance meets benchmarks (see Executive Summary)

✅ Business Analyst validates business logic

✅ Test report created and signed off

✅ No critical bugs found

*For detailed test cases, see* [*Video Tracking Scenarios Guide*](../02_BUSINESS_ANALYSIS/VIDEO_TRACKING_SCENARIOS_GUIDE.md)