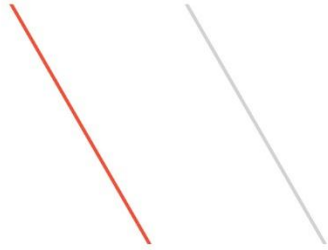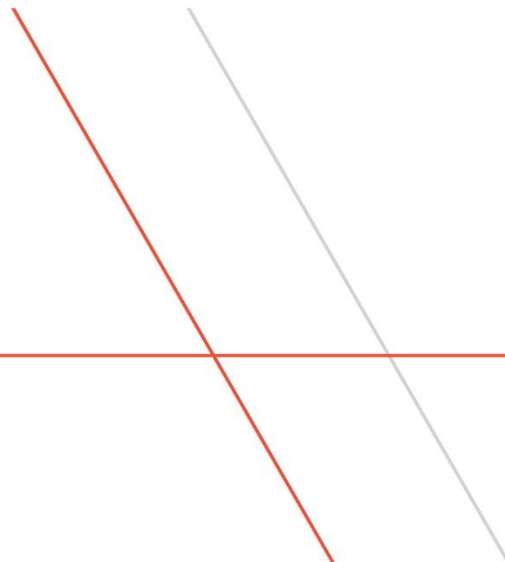# 2015 TPF Users Group
Event Message Business Events
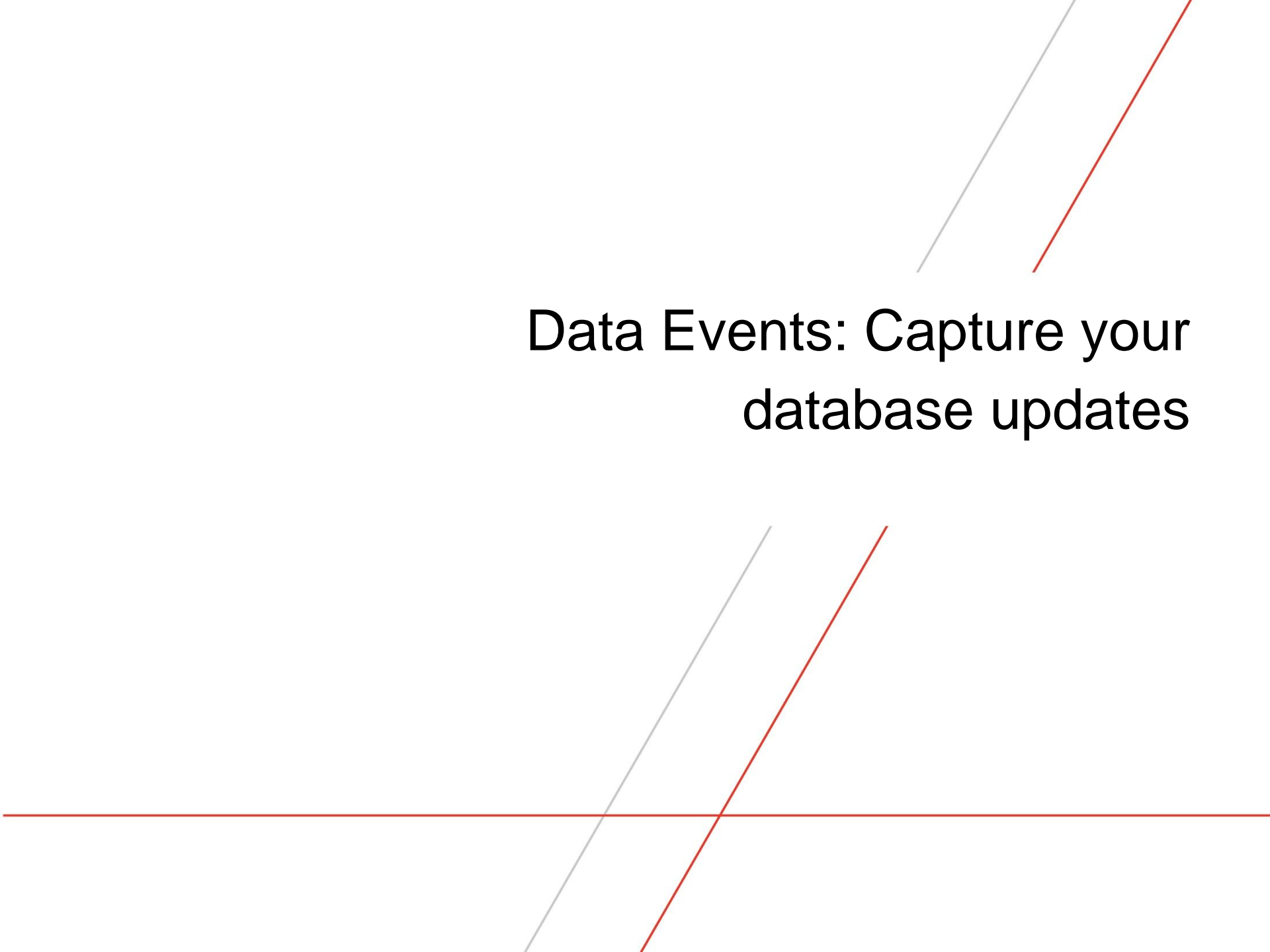
Chris Filachek, TPF Development Lab

March 24, 2015

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Agenda: Unlocking data on z/TPF Today's Business Events!
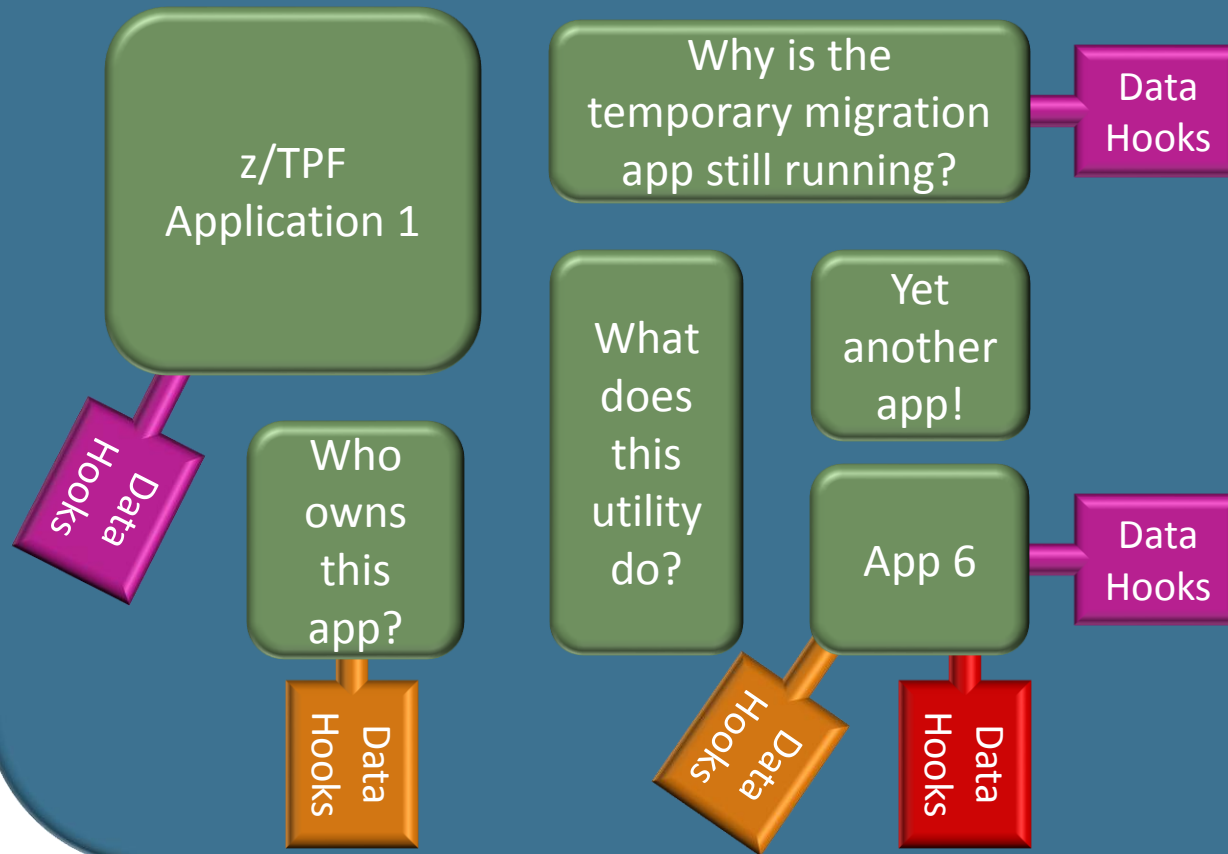
- ## Data Events
  - Capture database updates with no application changes

- ## Event Messages
  - Build event messages using flexible structure containing both data and context

- ## DFDL Schemas
  - Describe your event message across all platforms using a single standard language

- ## Next steps
  - Be involved in our hills and become a sponsor

Data Events: Capture your database updates

Before Data Events...

z/TPF

z/TPF Application 1

Data Hooks

Why is the temporary migration app still running?

Data Hooks

Who owns this app?

Data Hooks

What does this utility do?

Yet another app!

App 6

Data Hooks

Data Hooks

Data Hooks

- Applications changed to call hook every time update occurs

- Unique hooks to capture updates for each database

- Must maintain changes and may not invest in capturing all paths

After Data Events...

z/TPF

- z/TPF Application 1
- Why is the temporary migration app still running?
- Who owns this app?
- What does this utility do?
- Yet another app!
- App 6

- Create event specifications and dispatch adapters
- Create DFDL schema files to map data
- Write enrichment and custom format/transmit programs
- Enable data events to automatically capture updates

- Event Specs & Dispatch Adapters
- DFDL Schema Files
- Enrichment Programs
- Format & Transmit Programs

No Application Changes Required!

Data events for z/TPFDF

- Each data event for z/TPFDF represents one subfile
  - Capture only changed LRECs
  - Capture entire subfile
- Specify list of LREC IDs to capture
  - Capture all LRECs
  - Capture list of LREC IDs
- Defined and enabled through business events and DBDEF
- Uses business event infrastructure to process event
  - Enrichment: Application and dispatch enrichment
  - Formatting: Common Base Event (CBE), binary, and custom formats
  - Transmit: Websphere MQ and custom transmit
- Available today on PUT 11

Event Messages: Build your event message format

Event format on PUT 9

Event Data

- Signal Event: Data from tpf_bev_signal()
- Assumes all context is in the data

Event Message Format on PUT 11

Event Header	• Event name, timestamp, intercept name, etc. • Initialized and managed by z/TPF system
Event ECB Context	• Optional user area shared across events for an ECB
Event User Context	• Optional user area unique to an event
Event Data	• Signal Event: Data from tpf_bev_signal() • Data Event: Database context and changed data

Event Message Context

Event ECB Context

- Optional user area shared across events for an ECB
- May be created and updated at any time
  - Custom enrichment programs
  - Initial application processing
- Based on named ECB heap

Event User Context

- Optional user area unique to an event
- Created and updated by custom enrichment programs

Event Data for z/TPFDF

z/TPFDF Event Data

- Data event header
  - Data even type
  - Change Type
- z/TPFDF Context
  - z/TPFDF file ID and name
  - Prime file address
  - Timestamp and sequence number
- Data Event LREC List (0 or more)
  - Data Event LREC header
    - LREC ID and total size
    - Change type
  - LREC as seen by application

Business Events on PUT 9

Business Events

PUT 9 Business Event
tpf_bev_signal()

Event format only includes data provided on tpf_bev_signal()

Event Data
- Signal Event: Data from tpf_bev_signal()
- Assumes all context is in the data

Business Events on PUT 11

DFDL Schemas: Describe your event message

Business Events on PUT 9

Business Events

PUT 9 Business Event
tpf_bev_signal()

- TPF Data Model (TDM) used to describe event data

- Limited structure layouts and definitions

- TDM is TPF-specific and not supported on other platforms

Business Events on PUT 11

Business Events

Uses DFDL schemas to describe event message

Event Message Business Events

Uses TDM

Object
Signal Event

(PUT 9 "business event")

Event Message **Signal Event**

Data Events

Event Message **Data Event** for z/TPFDF

DFDL schema files for Business Events

- Shared between z/TPF and event consumers
  - z/TPF
    - Schemas are loaded to z/TPF and managed using common deployment
    - Referenced in business event specification
    - Use DFDL (tpf_dfdl*) and document (tpf_doc*) APIs to create XML or JSON documents
  - Event Consumers (remote systems)
    - Use DFDL parser to parse binary event messages
    - Use DFDL parser to create an XML, JSON, or custom structures
- Used for both signal events and data events
- Available on PUT 11

IBM

Next Steps

Data Events for z/TPF FIND/FILE Databases

A **business analyst** can do analytics and queries (SQL or other) **against a near real-time copy of the z/TPF FIND/FILE data without any z/TPF application changes required.**

Business Events in the Future...

Business Events

> **Event Message Business Events**

Object **Signal Event**

(PUT 9 "business event")

Event Message **Signal Event**

Data Events

Event Message **Data Event** for z/TPFDF

Event Message **Data Event** for FIND/FILE

What could FIND/FILE Data Events look like?

- Uses existing event message business event architecture and formats

- Single record view
  - Synchronous collection of updated data
  - Example: 4K overflow record presented as a data event

- Logical data view
  - Asynchronous collection of updated data
  - File address chains followed to create logical view of database entry
    - Standard Header with 4-byte or 8-byte file addresses
    - Embedded file addresses?
  - Data presentation options
    - Individual records: Prime record followed by 0 or more overflow records
    - Header stripped: Prime record followed by data only portion of overflow records

FIND/FILE Data Events Questions

- Database definition is embedded in application logic
    - Need to expose that to business events
- How to identify records are enabled for data events?
    - Is Record ID sufficient?
    - Other identifiers in conjunction with Record ID
        - Record Code Check (RCC)?
        - Program Filing Name?
        - Record Types (fixed record name, long term pool, short term pool)
        - Other?
- How to identify prime file address for current chain?
    - Data level or DECB name?
    - Backward chain?
    - User exit?

Questions?

References

APARs and Documentation

- APARs
  - PJ42280 and PI18980 (PUT 11 APARs)
  - PJ42834 and PI32332 (post PUT 11 performance enhancement and fixes)
- IBM Knowledge Center: Business Event Processing
  - http://www-01.ibm.com/support/knowledgecenter/SSB23S_1.1.0.11/com.ibm.ztpf-ztpfdf.doc_put.11/gtpb1/cbepcontainer.html?lang=en

Other Resources

- z/TPF Data Event Starter Kit
  - Use a z/TPF driver to create data events that are sent to a Java Application running on a remote system
  - Java Application uses the IBM DFDL parser (part of the IBM Integration Bus) to parse the event message into an XML document
  - http://www-01.ibm.com/support/docview.wss?uid=swg24039597
- Specification and event message templates
  - Templates for business event specifications, dispatch adapter specification, and event message DFDL schema files
  - Shipped with the z/TPF product in base/tpf-fdes/templates
- z/TPF Event Message Generator
  - Script you can use to create an event message DFDL schema file for your business events
  - http://www-01.ibm.com/support/docview.wss?uid=swg24039452

Business Event Processing Flow

- Synchronous to application ECB
  - Part of application ECB commit scope
- Application enrichment can access private ECB memory to build context
  - Event ECB context
  - Event user context

z/TPF Application
- tpf_bev_signal()
- DBCLS – update z/TPFDF subfile
- df_dev_create()

z/TPF Event Processing
- Create event message

Application Enrichment
- Optional user program
- Add context to event message

Local Dispatch Queue
- Add event message to local Websphere MQ queue
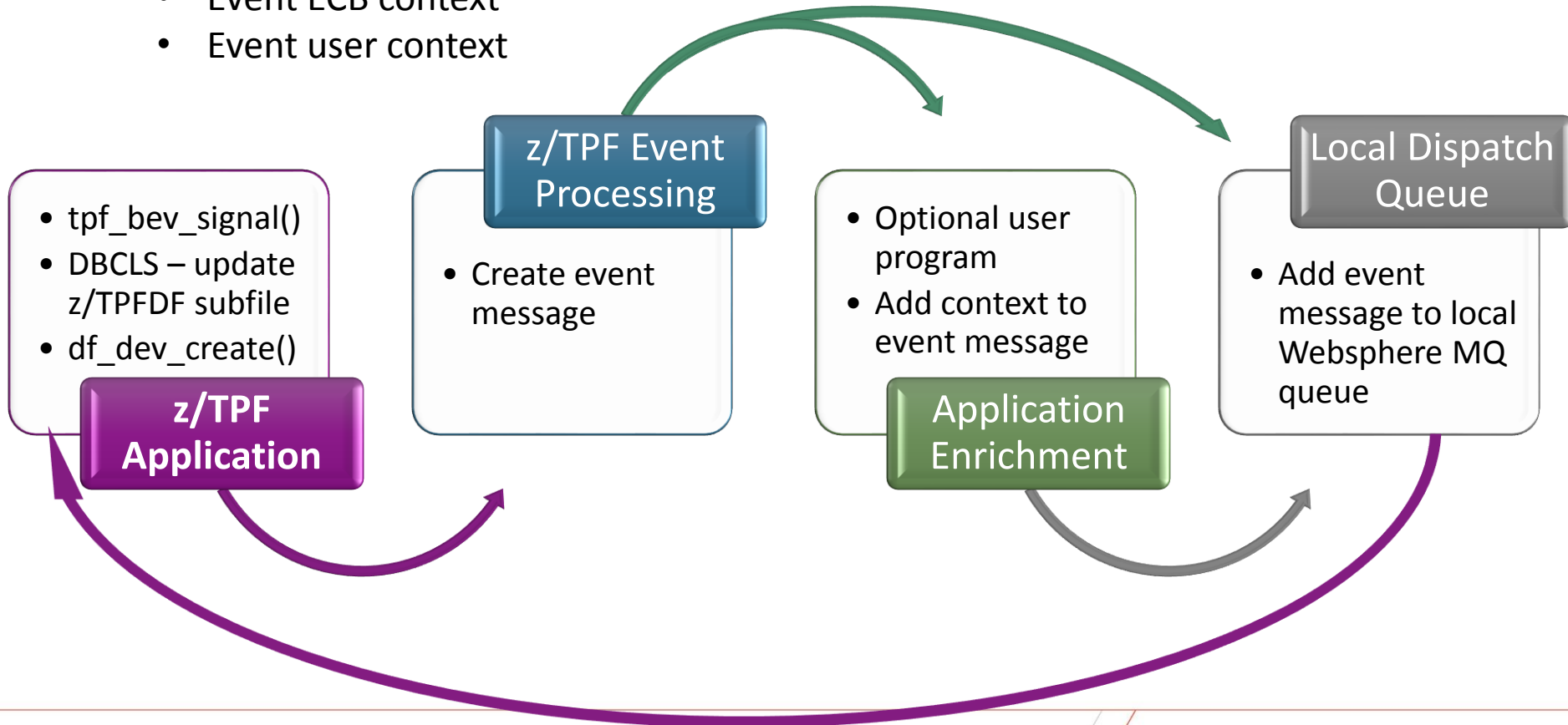
Business Event Processing Flow (cont.)

- Asynchronous to application ECB
  - Application commit scope was committed
- Dispatch enrichment can add context through I/O or accessing system memory
  - Application ECB is not available

Local Dispatch Queue
- Reads event message from local Websphere MQ queue

z/TPF Dispatch Processing
- Process event message
- Read full z/TPFDF subfile if required

Dispatch Enrichment ⭐
- Optional user program
- Add or update context

Dispatch adapters
- Format: CBE, bin, or user format
- Transmit: MQ or user transmit
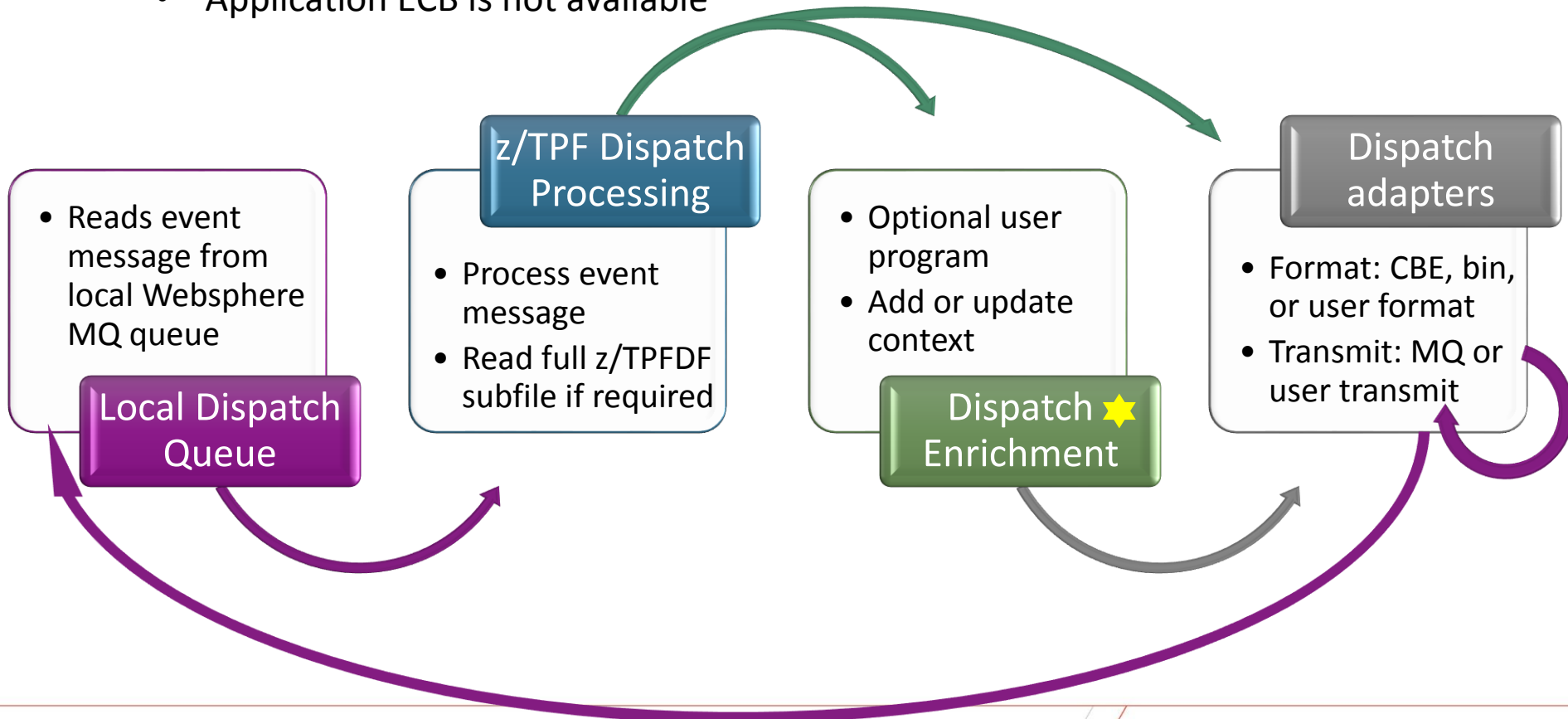
Business Event Specification
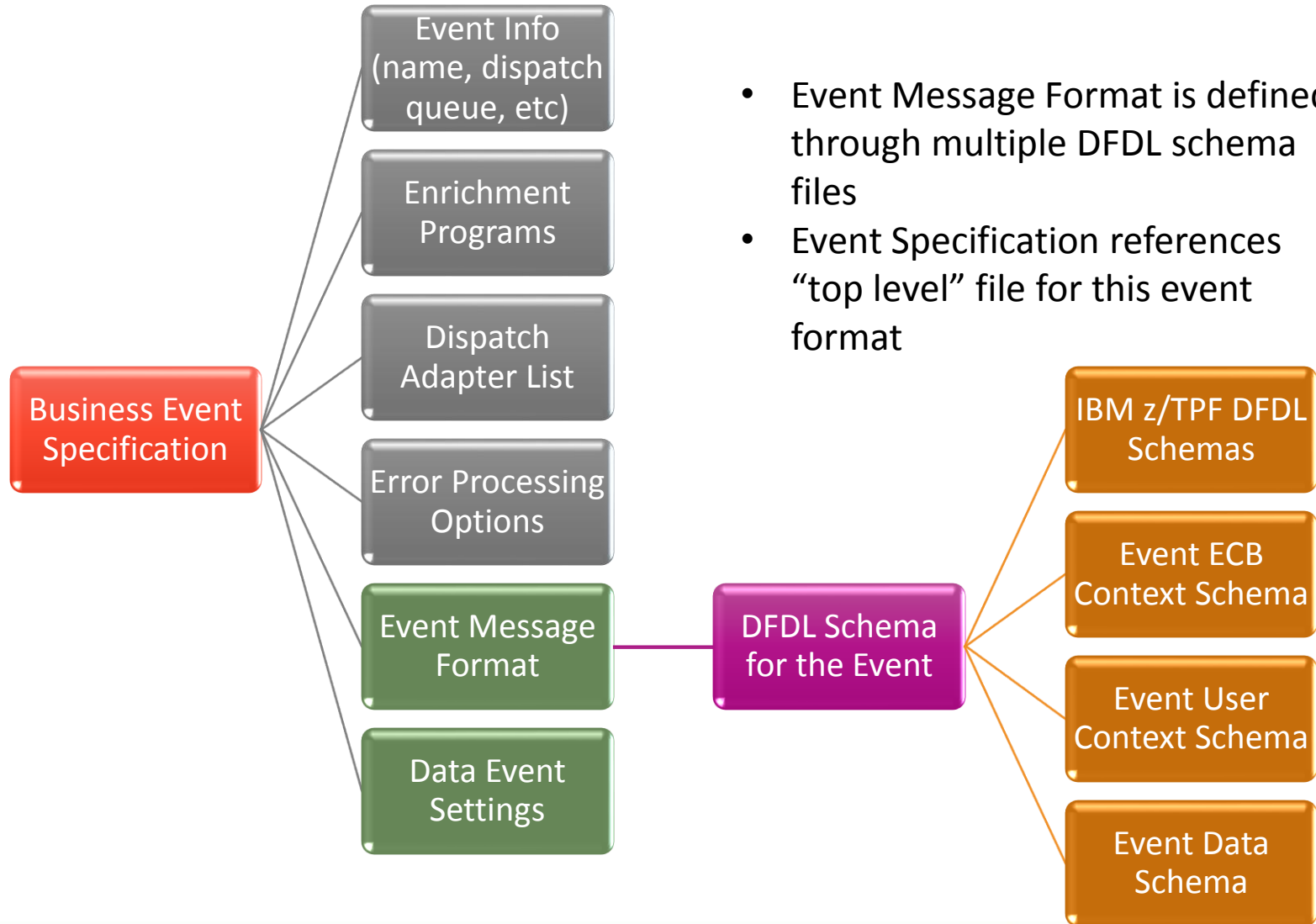
- Event Message Format is defined through multiple DFDL schema files
- Event Specification references "top level" file for this event format

Business Event Specification →
- Event Info (name, dispatch queue, etc)
- Enrichment Programs
- Dispatch Adapter List
- Error Processing Options
- Event Message Format → **DFDL Schema for the Event** →
  - IBM z/TPF DFDL Schemas
  - Event ECB Context Schema
  - Event User Context Schema
  - Event Data Schema
- Data Event Settings

Business Event Specification: Data Event Settings

Business Event Specification → Data Event Settings

Data Event Settings branches to:
- **Collection Type**
  - **Only changed LRECs** — -Collected at time of DBADD/DBREP/DBDEL/ etc. -Synchronous with application ECB
  - **Full Subfile** — -Subfile read after closed by application ECB -Asynchronous from application ECB
- **z/TPFDF File ID and Name**
- **LREC Include List**
  - **Include all LRECS**
  - **Include LRECS using LREC ID**
  - List includes LREC attributes: LREC name and uniqueness

Deploying Event Message Business Events

- Load all business event artifacts
  - Business event specification and dispatch adapters
  - DFDL schema files
  - Custom user programs
    - Application and dispatch enrichment
    - Event custom format and transmit programs
    - Event error program
  - DBDEF program z/TPFDF data events
- Deploy event specification and dispatch adapters
  - ZMDES DEPLOY ...
- Enable business events
  - ZBEVF ENABLE
- Watch your new event message business events flow!

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