



z/TPF Support for MongoDB

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IBM z/TPF
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- 5 Minutes **Problem statement**
- 10 Minutes **How does z/TPF Support for MongoDB work?**
- 10 Minutes **When do you use z/TPF Support for MongoDB?**
- 10 Minutes **z/TPF Support for MongoDB Function**
- 5 Minutes **z/TPF Support for MongoDB Performance**

Problem Statement

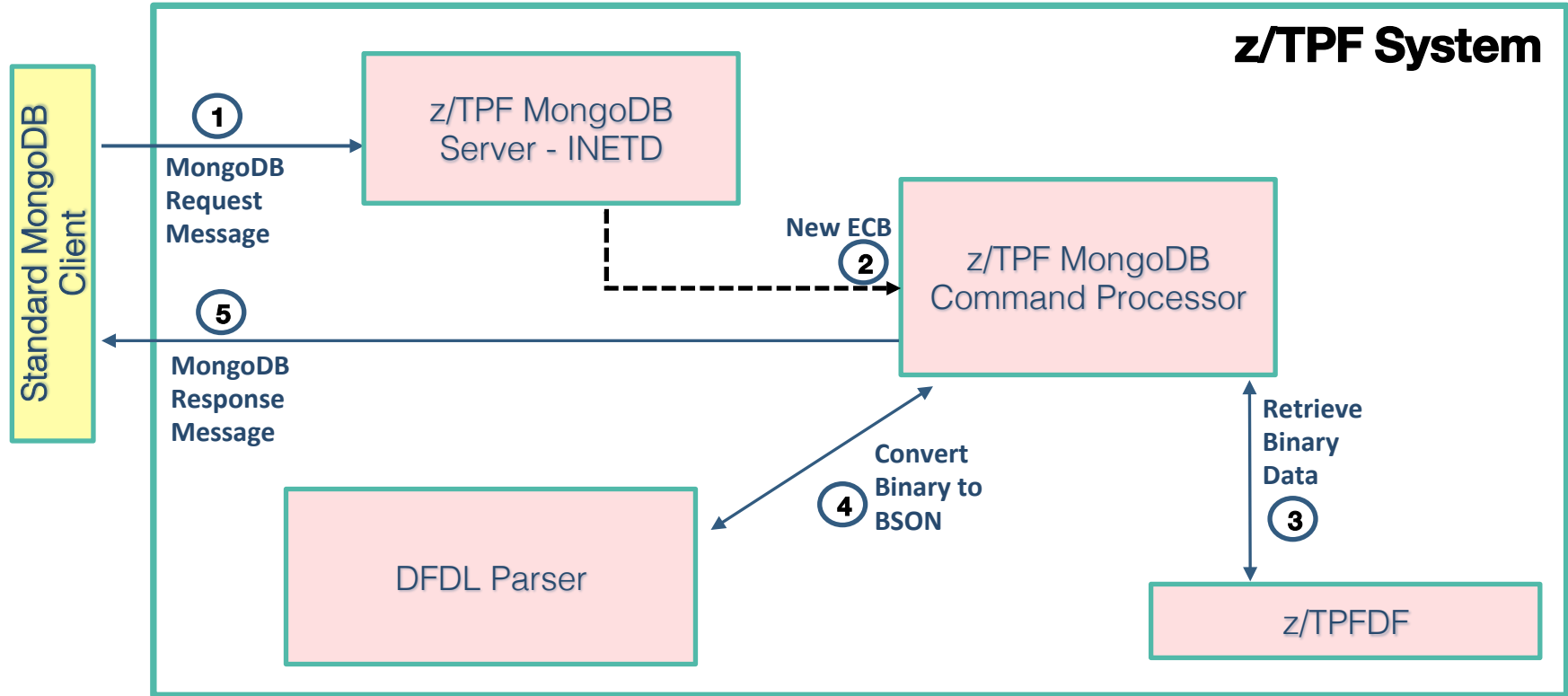
- Today, remote access to data residing on z/TPF requires application code on z/TPF and on the remote platform.
 - Custom connectors into z/TPF
 - Parsing input request / Formatting responses
 - Database Access, for example z/TPFDF calls
- Increased time to market of new business function.
- Cost of maintaining and enhancing these custom applications can be significant.
 - What if the database changes?
 - What if the data requested by the end user changes?

z/TPF Support For MongoDB

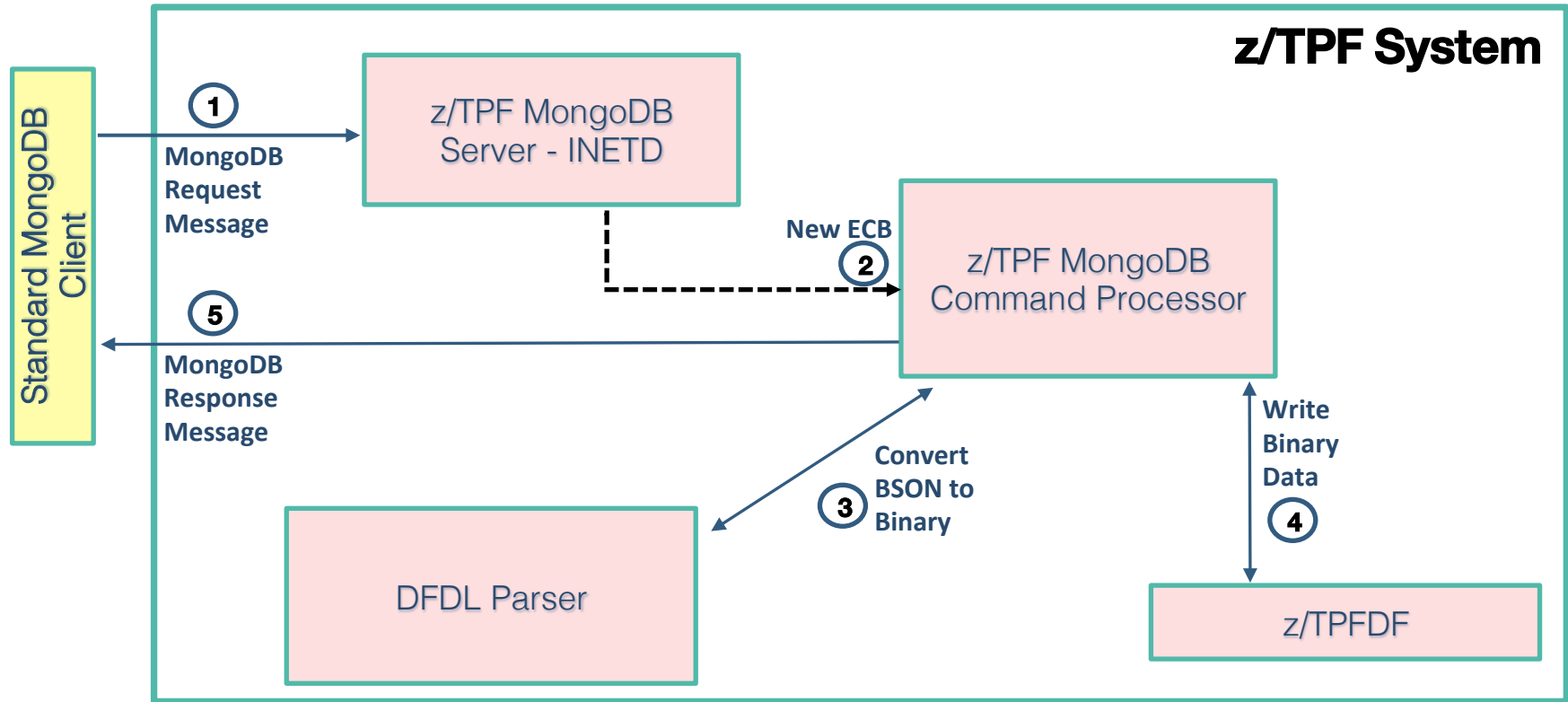
- Delivered in November of 2015
 - APARs PJ42292 and PI33010
- Can now access and update z/TPF data using a standard, unmodified MongoDB client on another platform.
 - Once definitions are created and loaded to the z/TPF system
 - Just point the remote MongoDB client to the z/TPF system!
 - No z/TPF application updates required
- Initial deliverable provides support for z/TPFDF databases.

How Does z/TPF Support For MongoDB Work?

Retrieving a MongoDB Document



Updating a MongoDB Document



z/TPFDF to MongoDB Mapping

z/TPF Layout

z/TPFDF subfile

File Address: 18043344

**LREC 70 – Passenger Number Record
Fields:**

**Passenger Number: 21
Loyalty Number: 12345**

**LREC 80 – Passenger Name Record
Fields:**

**Passenger Name: "Joe Smith"
Birth Date: "Jan 15, 1982"**

**LREC 80 – Passenger Name Record
Fields:**

**Passenger Name: "Bob
Jones"**

Birth Date: "Aug 12, 1975"

**DFDL
Conversion**



MongoDB Representation

```
{
  "PassengerNumberRecord" : [
    {
      "PassengerNumber" : 21
      "Loyalty Number" : 12345
    }
  ],
  "PassengerNameRecord" : [
    {
      "PassengerName" : "JOE SMITH"
      "Birthdate" : "Jan 15, 1982"
    }
    {
      "PassengerName" : "BOB JONES"
      "Birthdate" : "Aug 12, 1975"
    }
  ],
  "_id": ObjectId("000000000000000018043344")
}
```

z/TPFDF to MongoDB Mapping

z/TPF Layout

z/TPFDF subfile

File Address: 18043344

```
000B4600 00001500 00303900 2850D196
8540E294 89A38840 40404040 4040D181
9540F1F5 6B40F1F9 F8F24040 40404040
40404000 2850C296 8240D196 9485A240
40404040 4040C1A4 8740F1F2 6B40F1F9
F7F54040 40404040 404040
```

DFDL
Conversion



MongoDB Representation

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{
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    }
  ],
  "_id": ObjectId("000000000000000018043344")
}
```

Describing the Data With DFDL

- The z/TPFDF data needs to be described using DFDL
- z/TPF command driven tooling is provided to create the initial database description (Created for PUT 11 Data Events, Enhanced for MongoDB)
 - Optionally customize it to provide meaningful names to z/TPFDF files, paths, records, and fields.
- Database description is created once per z/TPFDF file
 - Provides additional benefits
 - Converting binary data to XML or JSON
 - On platform or off platform, for example, with data events.
 - DFDL descriptions of z/TPF data are planned to be used for future IBM deliverables

z/TPF Support for MongoDB Function

Creating Documents

Retrieving Documents

Updating Documents

Deleting Documents

Creating Documents

- **Create new z/TPFDF subfiles**
 - **Includes indexing document**

Creating Documents

Retrieving Documents

Updating Documents

Deleting Documents

Retrieving Documents

- **Retrieve one or more documents**
- **Ability to filter results**
 - **For example**

- **Retrieve all history records**

Or

- **Retrieve everything but history records**

Creating Documents

Retrieving Documents

Updating Documents

Deleting Documents

Updating Documents

- **Replace existing document**
- **Insert / Remove records within a document**
- **Update specific fields within logical records in a document**
- **Update indexes of a document**

Creating Documents

Retrieving Documents

Updating Documents

Deleting Documents

Deleting Documents

- **Deletes the entire document**
 - Includes deindexing document

Protecting data in flight

User Security

Performance Analysis

SSL for z/TPF MongoDB

- **Ability to start SSL version of MongoDB server on z/TPF**
 - **Option on Internet Daemon definition for the z/TPF MongoDB server**

Protecting data in flight

User Security

Performance Analysis

User Authentication and Authorization

- Ability to authenticate user names and passwords accessing MongoDB on z/TPF
 - Authentication performed via user exit
- Ability to define what resources (z/TPFDF files and subsystem users) a user can access with what privileges(ReadOnly or ReadWrite)*

*** This support will likely be deprecated in 2016. Working on z/TPF managed user database with a Role Based Access Control (RBAC) scheme.**

Protecting data in flight

User Security

Performance Analysis

Analyzing Performance of MongoDB on z/TPF

- **Resource Usage By Owner Name (ZMOWN)**
- **Analyze the performance of MongoDB by:**
 - **All of z/TPF MongoDB Access**
 - **Individual users accessing z/TPF through MongoDB**
 - **Individual resources (z/TPFDF files) accessed through MongoDB**

**When do you use z/
TPF Support for
MongoDB**

Remote Access to z/TPF Data

Web Services

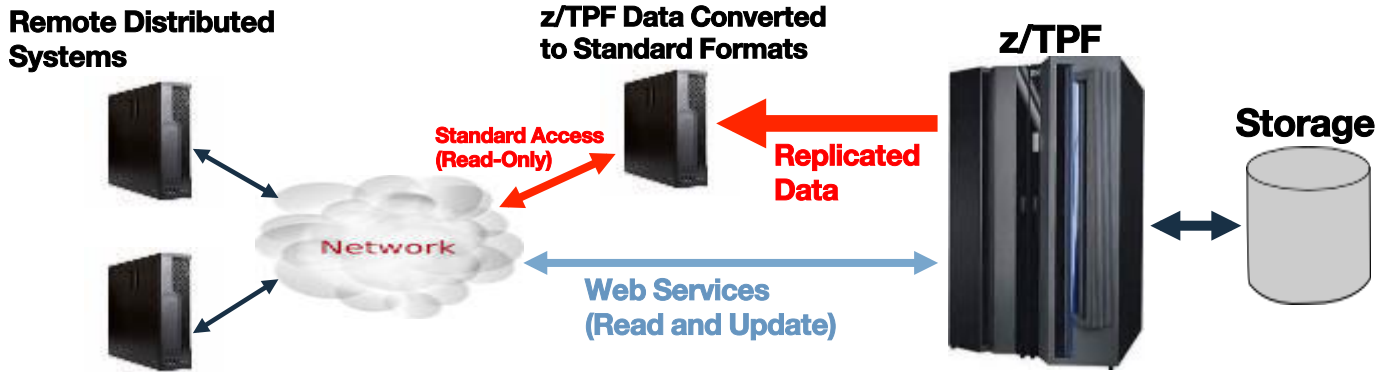


Web Services:

- Written and maintained by the customer.
- Exposing additional data requires z/TPF code updates.

Remote Access to z/TPF Data

Replicated Data

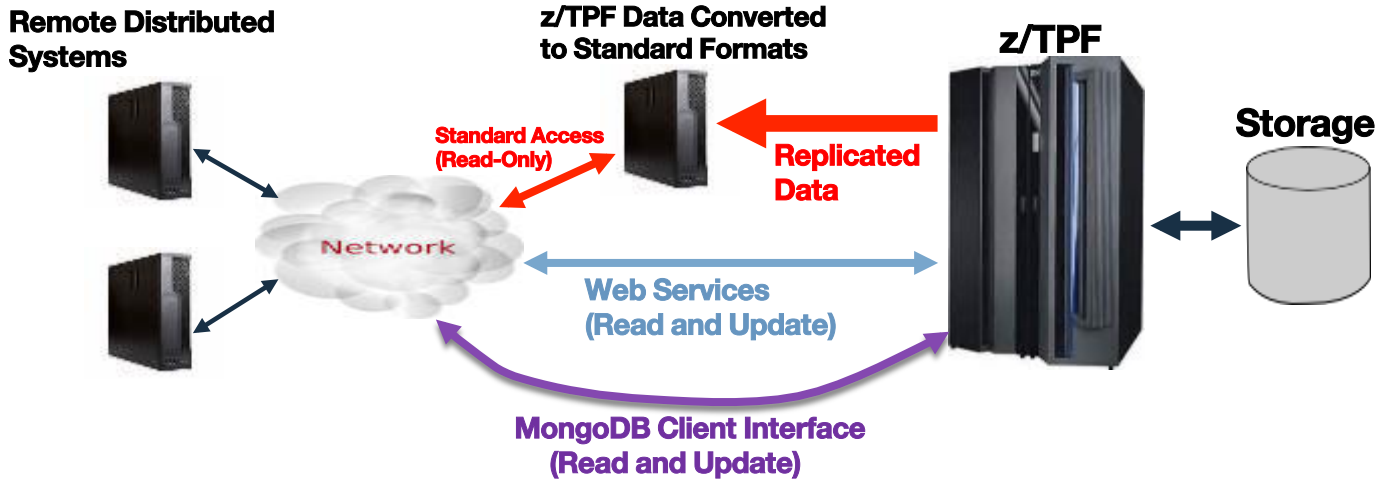


Replicated Data (using data events or your own methods):

- z/TPF data replicated on remote platform
- Converted to formats for standard access and analytics
- Read only data / Potential stale data

Remote Access to z/TPF Data

MongoDB Access to z/TPF



z/TPF Support for MongoDB

- Provides standard access directly into z/TPF

z/TPF Support for MongoDB
vs Replicated Data

z/TPF Support for MongoDB
vs Web Services

MongoDB vs. Replicated Data

- **Is the most recent copy of the data required?**
- **Does the cost of replicating the data exceed the cost of access using MongoDB?**
- **Is the type of query performed a good fit for running on z/TPF?**

z/TPF Support for MongoDB
vs Replicated Data

z/TPF Support for MongoDB
vs Web Services

MongoDB vs. Web Services

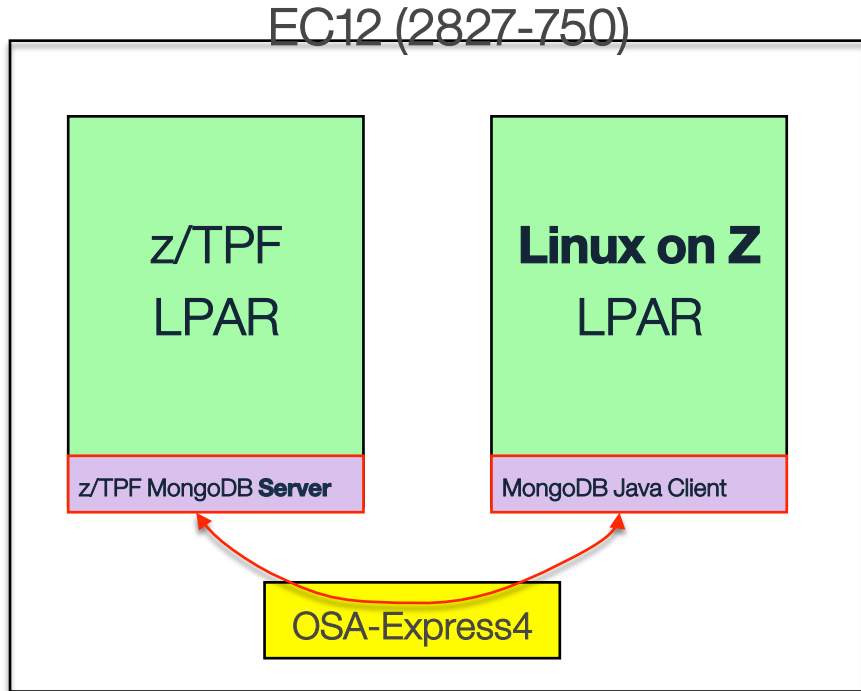
- **Is the update operation performed too complex for MongoDB?**
- **Is business logic required to perform the update operation?**
 - **Do I want to centralize business logic on z/TPF?**

z/TPF Support For MongoDB Use Case Comparison

z/TPF Data Access	Read Capability	Guaranteed Most Current Copy on Read	Update Capability	Complex Updates	No z/TPF Application Updates Required	Suitable for Ad-Hoc Queries
Replicated Data	✓				✓	✓
z/TPF Support for MongoDB	✓	✓	✓		✓	
Web Services	✓	✓	✓	✓		

z/TPF Support for MongoDB Performance

MongoDB Performance Testing Environment



- Each LPAR had **one dedicated** CPU
- All system traces turned off

Finding Documents in z/TPF

z/TPFDF subfile size (in bytes)	Overall Utilization	General Purpose Utilization*	Messages / Sec	Mils / Message
1000	99.2	40.7	9,613	0.103
10,000	96.3	20.9	3,413	0.282

*The general purpose utilization illustrates how much of the work is not z/TPF Transformation Engine (TE) eligible.

So for example, the query 10,000 byte subfile resulted in 78% of the work is TE eligible.

**** Performance results may vary**

Updating Individual Fields in z/TPF

z/TPFDF subfile size (in bytes)*	Overall Utilization	GP Utilization	Messages / Sec	Mils / Message
N/A	99.4	59.6	10,539	0.092

* Updated a field in z/TPFDF prime block so the size of the document not applicable

**** Performance results may vary**

Inserting/Removing Records in z/TPF

z/TPFDF subfile size	Overall Utilization	GP Utilization	Messages / Sec*	Mils / Message
1000	99.8	54.2	5,785	0.166
10,000	99.8	59.9	5,414	0.184

* 50% insert records and 50% remove records from a subfile

** Performance results may vary

z/TPF Support for MongoDB Summary

Summary

- Access and update z/TPF data using a standard, unmodified MongoDB client on another platform.
 - No z/TPF application updates required.
 - A distributed programmer does not need to know anything about z/TPF or z/TPFDF
- Support is delivered as two co-requisite APARs
 - PJ42292 – z/TPF Support for MongoDB
 - PI33010 – z/TPF command driven tooling

Additional MongoDB References

- z/TPF Support for MongoDB starter kit
 - <http://www.ibm.com/support/docview.wss?uid=swg24041510>
- z/TPF Support for MongoDB Demos
 - ibm.biz/TPFMongoDBDemo
- Understanding the MongoDB Use Cases BLOG Entry
 - ibm.biz/TPFMongoDBUseCase
- “Describing Your Database” topic in the z/TPF knowledge center
 - Walks you through creating DFDL from a z/TPFDF database definition

z/TPF Support For MongoDB

Future Improvements

- MongoDB User Security Enhancements
 - Easier management of users and their authorizations
- MongoDB Database Logging
 - Ability to diagnose problems and analyze the access of remote users accessing z/TPF support for MongoDB
- Increasing the z/TPF databases that can be accessed
 - Providing access to traditional z/TPF find/file databases
 - Lifting some of the restrictions we have on z/TPFDF databases

Thank you!

Questions or comments?

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