# IOT Services Catalog - Mainframe
## *(IOT's Product Code Reference Manual)*

## Fiscal Year 2021

### *Version 1.2*

# Purpose

This document provides Indiana Office of Technology's (IOT) customers a central place to find information about its Mainframe services.

# Contents

Mainframe related products contained in this document include:

**Note:** There is a separate [document](#) for all other IOT provided services.

| | |
|---|---|
| **Name** | **Jobs Production** |
| **Code** | 1066 |
| **Purpose** | Scheduling and Monitoring of Batch or Script processing on a variety of operation system platforms: |

✓ *IBM System z Mainframe*    ✓ *MS/Windows*    ✓ *UNIX*    ✓ *Linux*    ✓ *AIX*

| | |
|---|---|
| **Included** | |

**Around the clock service**

Conducted 24 / 7 / 365

**Large Scale Scheduling Capability**

*Professionally managed* to cover any scheduling requirement.

- o Independent, Dependent and Interdependent organization of batch and scripted workloads.
- o Currently scheduling
  - ▪ Hundreds of work threads.
  - ▪ Tens of Thousands of jobs and events daily.
  - ▪ Hundreds of Thousands of jobs and events managed overall.

**Automatic Scheduling**

- o Conducted by CA-7 Workload Automation product from Computer Associates, Inc.
- o Automatically **start** a single job, many jobs, a thread of jobs or many threads of jobs under a variety of interdependent conditions**:**
  - ▪ **Time-of-Day – Calendar Driven –** Includes holiday and weekend scheduling
    - ✓ Start work at a specified time of day or by special date consideration.
  - ▪ **Prerequisite Work**
    - ✓ Start new work when preceding work has completed.
  - ▪ **Milestones**
    - ✓ Start or resume paused work pursuant to consumer direction.
  - ▪ **Data and/or Resource Availability**
    - ✓ Start or resume paused work when prerequisite files or required computer resources are available.

**On Demand Scheduling**

Request initiation of a single job or many threads of work.

**Monitoring and Tracking**

Ensure scheduled work meets deadlines.

**Advance Tardy Notification**

Notification to key consumer individuals when run times for one job or threads of jobs are discovered slipping which could impact deadlines.

**Scheduling Consultation**

Conspire with IOT Workload Automation Schedulers to produce comprehensive and concentrated event scheduling plans.

**Scheduling Validation**

Coincidental to Scheduling Consultation, ensure that workloads are sequenced to avoid impact with one another

**Scheduling Management**

Consumer alerting and coordination of workload scheduling requirements to ensure deadlines are met while managing workloads through stand-alone activities which may impact workload processing.  An example of a stand-alone activity is implementation or conduct of operating system maintenance.

| | |
|---|---|
| **Rate** | $0.3532 Per Scheduled Job or Event |
| **Service Owner** | Todd Baxter, Deputy Chief Operations Officer – *Click to email the Service Owner a question.* |
| **Standard** | Not Applicable |
| **Cust Responsibility** | Understanding of and timely delivery of scheduling requirements for jobs, series of jobs. |
| **IOT Responsibility** | Translation of scheduling requests into computerized scheduling product(s). Monitoring of workloads including the delivery of alerts where scheduling or throughput anomalies occur. |
| **Ven Responsibility** | Scheduling Software technical support for usage, problem resolution and problem resolution. |

**SLO**

| | | |
|---|---|---|
| | **Requests:** | **Individual job requests – Same Day** Multiple job and small job series scheduling changes – 3 Business Days Large Job Series scheduling changes – 5 Business Days |
| | **Availability** | 99.9% Availability 24/7 |
| | **Incident** | All circumvented incidents resolved the same day IOT Recognizes the schedule impacts during throughput anomalies. |

| | |
|---|---|
| **Impact/Priority** | High/High |
| **Usage** | **3.13 Million Jobs \ Scripts Scheduled** (FY 2017) |

      -- Non-Mainframe platforms **.....................** 1.4   Million Jobs

      -- Mainframe **............................................**1.73 Million Jobs.

| | |
|---|---|
| **Reports** | Monthly IOT Performance Metrics – Click here |
| **Order** | Click here to request this service. |
| **Cancel** | Click here to cancel your existing service. |

| | |
|---|---|
| **Name** | **Disk Storage Subsystem** |
| **Service Code** | 1092 |
| **Purpose** | **Data Storage on Disk:** Mainframe disk storage measured in megabytes measured daily. |
| **Included** | **Usage:** ✓ Entry Sequenced ( Flat ) Files ✓ Indexed Files ✓ Relative Record Files |

> **Note:** Improved Performance available for the above using Virtual Storage functions.
> ✓ Data Base Extents; Any database operation including available DB2
> ✓ Wide variety of user specified files

**Hardware:** IBM Disk Storage Subsystem Model 8910 ( DS8910F )

**Available storage:** 10 TB

**High Performance:** Average response time of just over one micro second with the vast majority of input/output operations completing, on average, in less than a micro second.

**Retention Policy:** Determined by agency and applied to file properties at time of allocation.

**Dynamic Recoverability:**
✓ Available depending on data type and usage.
✓ Conducted by the agency; Convenience!
✓ IOT assist support available as needed

**User Data Set Retention:**
✓ Retained online for 180 days
✓ Migrated to tape for 3 years
✓ Final Disposition: Deleted.
✓ Dynamically recoverable by data set owner; Convenience!

**Disaster Recovery:** Synchronous replication of all disk data to the Disaster Recovery site in Bloomington, Indiana using local retention polices. See **Mainframe Services**, here, for description of mainframe Disaster Recovery services.

| | |
|---|---|
| **Not Included** | Not Applicable |
| **Dependencies** | System Security Authorization to allocate disk data sets. |
| **Rate** | $0.0002 Per MB Stored Per Day |
| **Cust Responsibility** | A computer with network access, as needed. IOT supports Blue Zone emulator software. |
| **IOT Responsibility** | Supply available storage upon demand. Ensure high performance throughput at all time. |
| **Ven Responsibility** | Maintain hardware reliability and current microcode levels |
| **Service Owner** | Todd Baxter, Deputy Chief Operations Officer – *Click to email the Service Owner a question.* |
| **SLO** | **Request:** Available within 3 Business days. |
| | **Availability:** 100% Availability during regular scheduled mainframe operation |
| | **Incident:** 90% Resolved within 16 IOT Business Hours (6am-6om, M-F excl. Holidays) |
| **Impact/Priority** | High/High |
| **Usage** | ***Does not include database activity*** |

Approximately ............ 32 Million files opened annually. (FY 2017)

                  ---14 Million Files allocated for Output

                  ---18 Million Files opened for Input

Approximately ....... 3,786 Billion Input / Output Operations annually (FY 2017)

Approximately ..... 86,733 Trillion Bytes of data transferred annually (FY 2017)

          - 23,457 Average bytes transferred in each I/O Operation

| | |
|---|---|
| **Reports** | Monthly IOT Performance Metrics – Click here |

| | |
|---|---|
| **Name** | **Tape Storage Subsystem ( Gigabytes of Consumed Tape Storage )** |
| **Service Code** | 1094 |
| **Purpose** | **Supply Virtual Tape** storage access to all mainframe workloads measured by individual mounting of any subsystem virtual tape. |

**Included**

**Hardware:**    IBM Tape Storage Subsystem Model 7760 ( TS7700 )
No Mylar/Oxide tapes – High Reliability – High Performance – High Availability

**High Performance Throughput:** Processing at the speed of disk

**Virtual Tape Storage Capacity:** 140 TB

**Virtual Tape Volumes:** 300,000 maximum

**Individual Tape Volume Capacity:** 6GB

**Maximum Virtual Tapes Mounted:** 512 at once (256 at Disaster Recovery Site)

**Disaster Recovery:**    Grid Communication for asynchronous replication of all virtual tape data to a TS7760 at the Disaster Recovery site in Bloomington, Indiana using local retention polices.  See **Mainframe Services**, here, for description of mainframe Disaster Recovery services.

**High Availability:**    Three TS7760 cluster operations, two in Indianapolis and one in Bloomington, provide seamless and immediate access, via Grid Communication, for local mainframe operation to all replicated tape volumes at the Disaster Recovery site in Bloomington, Indiana for any failure occurring to either of the two local TS7760s in operation.

| | |
|---|---|
| **Dependencies** | System Security Authorization to allocate tape data sets. |
| **Rate** | $0.0277 Per Gigabyte of Consumed Storage |
| **Standard** | **Not Applicable** |
| **Cust Responsibility** | Technical skills to code work that accesses virtual tape services |
| **IOT Responsibility** | Supply available storage upon demand.  Ensure high performance throughput at all time. |
| **Ven Responsibility** | Maintain hardware reliability and current microcode levels |
| **Service Owner** | Todd Baxter, Deputy Chief Operations Officer – *Click to email the Service Owner a question.* |
| **Metric** | 100% Availability during regular scheduled mainframe operation |

**SLO**

**Request:**    Completed within 3 Business days.

**Availability:**    100% Availability during regular scheduled mainframe operation

**Incident:**    90% Resolved within 16 IOT Business Hours (6am-6om, M-F excl. Holidays)

| | |
|---|---|
| **Impact/Priority** | High/High |

**Usage**

Approximately .............. 6 Million tape mounts annually. (FY 2017)

-- 4.2 Million Mounts for Input

-- 1.8 Million Mounts for Output

Approximately ......... 98.4 Billion Input / Output Operations annually (FY 2017)

Approximately ....... 2,429 Trillion Bytes of data transferred annually (FY 2017)

- 24,654  Average bytes transferred in each I/O Operation

| | |
|---|---|
| **Reports** | Monthly IOT Performance Metrics – Click here |
| **Order** | Click here to request this service. |
| **Cancel** | Click here to cancel your existing service. |

| Name | **Batch / System** |
|------|--------------------|
| **Service Code** | 1206 |

| **Service Index** | **Database Services** | **24 / 7 / 365  Support** | **Modernized COBOL** |
|-------------------|------------------------|----------------------------|------------------------|
| ( Click to Go ) | **File Management** | **Virtual Tape Services** | **Library Management** |
| | **Alert Services** | **Disaster Recovery** | **Transaction Server** |
| | **Report Distribution** | | |

**Service Purpose**

Highly configurable, highly reliable, highly recoverable, high performance and cost controlled operation in all areas of application system throughput and delivery.  The following services are *immediately available* for customer assignment or Proof of Concept anywhere IOT Network services are found:

- **Time Sharing Option –**   ( TSO )  Highly configurable interactive access and operation for a variety of work and in a variety of scripting and programming languages.  Interfaces with various aspects of the operating system including the ability for various forms of interactive SQL in DB2.

- **Java / Node.js** – Support for development and operation of this popular language.

- **C++** - Support for development and operation of this popular language.

- **Apache / WebSphere Application Services –** Host your Web applications here.

- **Modernized COBOL** development and operation

- Sophisticated development program **library management** and change control.

- **IBM's File Manager** - User friendly tools for comprehensive file management and data manipulation, working with many file structures and databases present or operating on the IBM System z mainframe.  Among File Manager capabilities is the definitions of files, browsing, editing, copying and printing of data stored in a variety of forms:

  - Unix files
  - Flat files
  - Virtual Managed files (VSAM)
  - Indexed files
  - CICS Storage Resources
  - DB2 – Various data and resources

  - IMS – Manipulate elements and data
  - Map record elements
  - Sort data
  - Perform Sophisticated Comparisons
  - Invoke REXX routines; Automation

- **Alert Services** for anomalous change in application system or subsystem operation delivered by eMail.

- **Report Distribution** – On-demand delivery directly from mainframe operation to network printers and eMail boxes in a variety of formats.

- **24 / 7 / 365 Support** – Continuous operational staffing for response to all operational needs.

- **Virtual Tape Library** -    No Mylar/Oxide tapes - High Reliability - High Performance - 140 TB
  Click **here** to access **Virtual Tape Library** service

- **Comprehensive Disaster Recovery  ( DR ) – Included**
  - **A Twin IBM System z** mainframe operation, located at the University of Indiana, operating as disaster recovery warm site.
  - **Nearly Instantaneous Replication** of all disk and tape storage to DR operation in Bloomington, Indiana.
    - 140 TB of tape storage
    - 10 TB of disk storage
      - ✓ Includes separate semi-daily disk snapshots for a total of three off-site versions
      - ✓ Semi-Daily disk snapshots permit full Disaster Recovery event testing without impact to continuous live operation in Indianapolis; zero impact.

- Available three times each calendar year for disaster recovery assurance testing
  - Hardware, Software and Operation included in the service rate.
  - DR testing services are a collaboration between the Agency, Mainframe Services, and Middleware Operational service teams organized, managed, conducted and documented by DR Project Management Services. Click here for additional Disaster Recovery information from IOT.
- **Complete Network Access** to live or test DR operation from anywhere IOT Network services are found.
- Recovery Time Objective (RTO – Downtime) - This requirement directs restoration of service 6 hours from the time the CIO declares an actual disaster upon advice from the Governor.
- DR Recover Point Objective (RPO – Data loss) will be worked agency specific, as they may vary with the agency system

| | |
|---|---|
| **Extended Services** | Available for development and customization to user specification without procurement. Arrangement by Service Owner. |

**Performance Metrics Reporting**

- Highly detailed and/or summarized reporting, delivered to customer inboxes, is available on a variety of performance, throughput and resource consumption metrics.  From transaction response time to data throughput, reporting demonstrates that SLA requirements, determined and agreed upon by IOT and the customer, are being met. Reporting is also available for customer application performance tuning.  A wealth of performance and throughput reporting is available.

| | |
|---|---|
| **Obtainable Services** | Available for procurement or development by arrangement of Service Owner. |

**Linux High Performance Hosting**

- Host Linux applications, application suites or databases on a high performance Linux operation, participating as a local or distributed operation.  When operating, this extended service Includes Disaster Recovery services.

**Application Program Interface**

- SOAP or RESTful API interface to mainframe application operation.  Deliver APIs to a variety of application services including HTTP.

**API Management**

- Manage, deliver and secure APIs.

| | |
|---|---|
| **Rate** | $0.0154 Per CPU Second |
| | **Explanation:** Product 1206 consist of the accumulated CPU seconds for both the TSO and Batch transaction records found in the SMF Type 30 records that are generated from activity occurring on the mainframe. Below you will find the record detail and subtypes definition. |

**SMF Type 30 -  C**ontains z/OS address space accounting information

**Subtype 1 - Address Space Start**

**Subtype 2 - Activity through previously recorded interval - Intermediate accounting record**

**Subtype 3 - Activity for the last interval before step termination**

**Subtype 4 - Step Totals**

**Subtype 5 - Address Space Termination**

**Subtype 6 - System Address Space**

| | |
|---|---|
| **Service Owner** | Todd Baxter, Deputy Chief Operations Officer – *Click to email the Service Owner a question.* |
| **Standard** | **Not Applicable** |
| **Cust Resp** | A computer with network access, as needed.  IOT supports Blue Zone emulator software. |
| **Metric** | 99.9% Mainframe Availability 24/7 – IBM, IMS, DB2 – See **Reports** below. |
| **Impact/Priority** | High/High |

| | |
|---|---|
| **Lead Time** | ***None Required.*** Immediately available for operating mainframe application systems. |
| **Measurement** | Mainframe operating system IBM System z Operating System; z/OS Version 2 Release 3 |
| | TSO ---- 45.8 **M**illion Standard Business Day Transactions (FY 2017) – 47.2 **M**illion Total |
| **Reports** | Monthly IOT Performance Metrics – Click here |
| **Dependencies** | None |

**Roles and Responsibilities**

1. **Operation**

   Maintain and monitor 24 / 7 / 365 operation of all mainframe services identified in this Service Catalog. Maintenance and monitoring of operations include production of and response to automated notifications.

2. **Performance**

   Ensure all workloads, batch and transactional, are dynamically managed to agreed upon service levels established between the consumer and IOT. Select workload elements are eligible to be singled out to be negotiated for special handling. Produce performance reporting, as required, to demonstrate expected performance is being obtained.

3. **Staffing**

   a. **Operations**

   Provide on-site personnel on a 24 / 7 / 365 basis to conduct maintenance and oversight of workload scheduling. Conduct observation of operational performance and throughput.

   b. **System Administration**

   Provide on-site personnel during normal business hours to conduct the entire scope of system administration duties. Maintain a 24 / 7 / 365 on-call rotation to address anomalies discovered by Operations.

4. **Consumer Support**

   a. **Established Services**

   Participate with or engage consumers with regard to use, operation, performance and cost control of all mainframe services identified in this Service Catalog

   b. **Prospective Services – Including Proof of Concept**

   Participate with or engage consumers along a broad range of available information technology services. Introduce available technology elements available in established services. Introduce available technology as an opportunity to modernize, streamline and control cost as it relates to consumer missions.

5. **Maintenance**

   Conduct comprehensive maintenance tasks as a part of mainframe management in support of mainframe services identified in this Service Catalog. Includes maintenance of application of hardware or software elements. Includes least disruptive utility maintenance activities to ensure optimum performance.

6. **Vendor Support**

   Maintain vendor software and hardware support by ensuring hardware, operating system, subsystems and third party services, identified in this Service Catalog, remain within end-of-life spans.

7. **Cost Control**

   Manage and control consumption of consumer billable system resources to maximize information technology budgets.

8. **Change Control**

   Comply with established IOT Change Control standards, processes and schedules.

9. **Incident Management**

   ◉ Incident Management applies to all aspects of mainframe operation.

   ◉ Use established problem determination methods to identify cause of availability or performance impact. Then, **restore** impacted service to consumer expected levels, circumventing impact as required or available with emphasis to restore expected service **As Soon As Possible**.

   ◉ Escalate through IOT management and administration as required.

   ◉ Engage and escalate with vendor support entities as required.

10. **Root Cause Resolution**

    Identify, resolve and report root causes for all performance deficiencies and out-of-service incidents.

11. **Disaster Recovery Engagements**  -  Click here for  information on IOT Disaster Recovery Services

    a. **Central Processor Complex:** Maintain 24 / 7 / 365 operational status of twin IBM System z in Bloomington, Indiana as a warm site for:

        i. Live Disaster Recovery Operation

        ii. Disaster Recovery Exercises

    b. **Data Storage; Off Site Synchronous Replication:** Maintain 24 / 7 / 365 replication of local *disk* and *tape* storage subsystem data to like storage subsystems in Bloomington, Indiana for Disaster Recovery purposes.

        ➢ **Disk Subsystem storage** replication provides Disaster Recovery warm site options as this replicated data is not qualified as not high availability.  This data is accessible by only the Twin IBM System z operation at the Disaster Recovery site.  In the case of an actual disaster, Disaster Recovery operation of the Twin IBM System z at the Disaster Recovery Site has the access to the replicated data on the Disk Subsystem to which it is connected in Bloomington, Indiana.

        ➢ Click **here** for description of high availability of access to **Virtual Tape** data.

    c. **Data Storage; Off Site Auxiliary Storage:**  Maintain two semi-daily snapshots of entire disk subsystem as an auxiliary DR safety net or for use during Disaster Recovery test events.

    d. **Testing:** Fully support Disaster Recovery exercises as required by consumers and managed by DR Project Management Services.  Maintain vendor contracts to ensure availability of three (3) Disaster Recovery tests each calendar year.

| | |
|---|---|
| **Name** | **Relational Database – DB2** |
| **Service Code** | 1207 |

| **Service Index** | **Java / Node.js** | **Database Services** | **24 / 7 / 365  Support** |
|---|---|---|---|
| | **Alert Services** | **Disaster Recovery** | **SOAP / API / JSON** |

**Service Purpose**  Highly configurable, highly reliable, highly recoverable, high performance and cost controlled DB2 operation in all areas of application system throughput and delivery.  The following services are *immediately available* for customer assignment or Proof of Concept anywhere IOT Network services are found:

- **Java / Node.js** – Support for development and operation of this popular language.
- **DB2 Relational Database Services**
  - ➢ z/OS - Operates on IBM's System z flagship operating system, z/OS
  - ➢ Linux - Operates on IBM System z Integrated Facility for Linux (IFL)
  - ➢ Available to **JDBC/ODBC** connectivity as identified herein.
  - o Utilization of **SOAP** and **RESTful APIs** via **JSON** ( See Obtainable Services, here )
  - o **Application Interfaces**

    Within various exploitations or limitations, DB2 on the IBM System z interfaces with**:**
    - ▪ **Local Operation:** Application systems contained within IBM System z mainframe operation.
    - ▪ **Remote/Distributed** application program products and services running on virtually any operating system platform that requires relational database services by an extensive selection of application development products.  Remote operating systems include:
      - ✓ Other IBM System z operations
      - ✓ **Linux** Application Servers, including high performance Linux operation available, contained within the current IBM System z mainframe operation.
      - ✓ **UNIX** Application Servers, including high performance UNIX operation available, contained within the current IBM System z mainframe operation.
      - ✓ **Windows** Application Servers
      - ✓ IBM AIX operation
      - ✓ Others
    - ▪ **Application Development Products:**
      - ✓ **.Net** including Visual Basic, both Microsoft or third party
      - ✓ C, C+, C++, C#      ✓ Python
      - ✓ Java - Any Provider of Java  ✓ Perl
      - ✓ JavaScript      ✓ Many others...

- **Comprehensive Disaster Recovery  ( DR ) – Included**
  - o **A Twin IBM System z** mainframe operation, located at the University of Indiana, operating as disaster recovery warm site.
  - o **Nearly Instantaneous Replication** of all disk and tape storage to DR operation in Bloomington, Indiana.
    - ▪ 140 TB of tape storage
    - ▪  10 TB of disk storage
      - ✓Includes separate semi-daily disk snapshots for a total of three off-site versions
      - ✓Semi-Daily disk snapshots permit full Disaster Recovery event testing without impact to continuous live operation in Indianapolis; zero impact.
  - o **Available three times each calendar year** for disaster recovery assurance testing
    - ▪ Hardware, Software and Operation included in the service rate.

- ▪ DR testing services are a collaboration between the Agency, Mainframe Services, and Middleware Operational service teams organized, managed, conducted and documented by DR Project Management Services. Click here for additional Disaster Recovery information from IOT.
  - o **Complete Network Access** to live or test DR operation from anywhere IOT Network services are found.
  - o Recovery Time Objective (RTO – Downtime) - This requirement directs restoration of service 6 hours from the time the CIO declares an actual disaster upon advice from the Governor.
  - o DR Recover Point Objective (RPO – Data loss) will be worked agency specific, as they may vary with the agency system
- **IBM's File Manager** - User friendly tools for comprehensive file management and data manipulation, working with many file structures and databases present or operating on the IBM System z mainframe.  Among File Manager capabilities is the definitions of files, browsing, editing, copying and printing of data stored in a variety of forms:

  - o Unix files
  - o Flat files
  - o Virtual Managed files (VSAM)
  - o Indexed files
  - o CICS Storage Resources
  - o DB2 – Various data and resources

  - o IMS – Manipulate elements and data
  - o Map record elements
  - o Sort data
  - o Perform Sophisticated Comparisons
  - o Invoke REXX routines; Automation

- **Alert Services** for anomalous change in application system or subsystem operation delivered by eMail.
- **Report Distribution** – On-demand delivery directly from mainframe operation to network printers and eMail boxes in a variety of formats.
- **24 / 7 / 365 Support** – Continuous operational staffing for response to all operational needs.
- **Virtual Tape Library** -    No Mylar/Oxide tapes - High Reliability - High Performance - 140 TB
  Click **here** to access **Virtual Tape Library** service

| | |
|---|---|
| **Extended Services** | Available for development and customization to user specification without procurement. Arrangement by Service Owner. |

**Performance Metrics Reporting**

- Highly detailed and/or summarized reporting, delivered to customer inboxes, is available on a variety of performance, throughput and resource consumption metrics.  From transaction response time to data throughput, reporting demonstrates that SLA requirements, determined and agreed upon by IOT and the customer, are being met. Reporting is also available for customer application performance tuning.  A wealth of performance and throughput reporting is available.

| | |
|---|---|
| **Obtainable Services** | Available for procurement or development by arrangement of Service Owner. |

**Linux High Performance Hosting**

- Host Linux applications, application suites or databases on a high performance Linux operation, participating as a local or distributed operation.  When operating, this extended service Includes Disaster Recovery services.

**Application Program Interface**

- SOAP or RESTful API by JSON interface to existing or newly developed mainframe application operation.  Deliver APIs in HTTP to a variety of application services on any platform.

**API Management**

- Manage, deliver and secure APIs.

| | |
|---|---|
| **Rate** | 0.0119 Per CPU Second |
| | **Explanation:** Product 1207 consists of the accumulated CPU seconds for all DB2 transactions records found in the SMF Type 101 records that are generated from activity occurring on the mainframe. Below is the record description. |
| | **SMF Type 101 -** DB2 - Account for resources during a transaction |
| **Service Owner** | Todd Baxter, Deputy Chief Operations Officer – *Click* to email the Service Owner a question. |
| **Standard** | **Not Applicable** |
| **Cust Resp** | A computer with network access, as needed.  IOT supports Blue Zone emulator software. |
| **Metric** | 99.9% Mainframe Availability 24/7 – IBM, IMS, DB2 – See **Reports** below. |
| **Impact/Priority** | High/High |
| **Lead Time** | ***None Required.***  Immediately available for operating mainframe application systems. |
| **Measurement** | Mainframe operating system IBM System z Operating System; z/OS Version 2 Release 1 |
| | DB2  ----  75  **M**illion Standard Business Day Transactions  (Fy 2017) – 76.5 **M**illion Total |
| **Reports** | Monthly IOT Performance Metrics – Click here |
| **Dependencies** | None |
| **References** | **DCS**........... Viswanath Atluri |
| | FSSA......... Sandy Mowery |
| | FSSA ........ Rick Shull |

## Roles and Responsibilities

**1. Operation**

Maintain and monitor 24 / 7 / 365 operation of all mainframe services identified in this Service Catalog.  Maintenance and monitoring of operations include production of and response to automated notifications.

2. **Performance**

Ensure all workloads, batch and transactional, are dynamically managed to agreed upon service levels established between the consumer and IOT.  Select workload elements are eligible to be singled out to be negotiated for special handling.  Produce performance reporting, as required, to demonstrate expected performance is being obtained.

3. **Staffing**

   a. **Operations**

Provide on-site personnel on a 24 / 7 / 365 basis to conduct maintenance and oversight of workload scheduling.  Conduct observation of operational performance and throughput.

   b. **System Administration**

Provide on-site personnel during normal business hours to conduct the entire scope of system administration duties. Maintain a 24 / 7 / 365 on-call rotation to address anomalies discovered by Operations.

4. **Consumer Support**

   a. **Established Services**

Participate with or engage consumers with regard to use, operation, performance and cost control of all mainframe services identified in this Service Catalog

   b. **Prospective Services  –  Including Proof of Concept**

Participate with or engage consumers along a broad range of available information technology services.  Introduce available technology elements available in established services.  Introduce available technology as an opportunity to modernize, streamline and control cost as it relates to consumer missions.

5. **Maintenance**

Conduct comprehensive maintenance tasks as a part of mainframe management in support of mainframe services identified in this Service Catalog.  Includes maintenance of application of hardware or software elements.  Includes least disruptive utility maintenance activities to ensure optimum performance.

6. **Vendor Support**

Maintain vendor software and hardware support by ensuring hardware, operating system, subsystems and third party services, identified in this Service Catalog, remain within end-of-life spans.

7. **Cost Control**

Manage and control consumption of consumer billable system resources to maximize information technology budgets.

8. **Change Control**

Comply with established IOT Change Control standards, processes and schedules.

9. **Incident Management**
   - Incident Management applies to all aspects of mainframe operation.
   - Use established problem determination methods to identify cause of availability or performance impact.  Then, **restore** impacted service to consumer expected levels, circumventing impact as required or available with emphasis to restore expected service **As Soon As Possible**.
   - Escalate through IOT management and administration as required.
   - Engage and escalate with vendor support entities as required.

10. **Root Cause Resolution**

Identify, resolve and report root causes for all performance deficiencies and out-of-service incidents.

11. **Disaster Recovery Engagements**  -  Click here for  information on IOT Disaster Recovery Services
    a. **Central Processor Complex:** Maintain  24 / 7 / 365  operational status of twin IBM System z in Bloomington, Indiana as a warm site for:
       i. Live Disaster Recovery Operation
       ii. Disaster Recovery Exercises
    b. **Data Storage; Off Site Synchronous Replication:** Maintain  24 / 7 / 365  replication of local *disk* and *tape* storage subsystem data to like storage subsystems in Bloomington, Indiana for Disaster Recovery purposes.
       - **Disk Subsystem storage** replication provides Disaster Recovery warm site options as this replicated data is not qualified as not high availability.  This data is accessible by only the Twin IBM System z operation at the Disaster Recovery site.  In the case of an actual disaster, Disaster Recovery operation of the Twin IBM System z at the Disaster Recovery Site has the access to the replicated data on the Disk Subsystem to which it is connected in Bloomington, Indiana.
       - Click **here** for description of high availability of access to **Virtual Tape** data.
    c. **Data Storage; Off Site Auxiliary Storage:**  Maintain two semi-daily snapshots of entire disk subsystem as an auxiliary DR safety net or for use during Disaster Recovery test events.
    d. **Testing:** Fully support Disaster Recovery exercises as required by consumers and managed by DR Project Management Services.  Maintain vendor contracts to ensure availability of three (3) Disaster Recovery tests each calendar year.

| | |
|---|---|
| **Name** | **Hierarchical Database - IMS** |
| **Service Code** | 1208 |

**Service Index**

| | | |
|---|---|---|
| **Java / Node.js** | **24 / 7 / 365  Support** | **Alert Services** |
| **Disaster Recovery** | **SOAP / API / JSON** | |

**Notice: Availability of this product is discontinued.**

**Service Purpose**

**Full Support of** IBM's fully matured and highly reliable **I**nformation **M**anagement **S**ystem; IMS.

**Click here for more information on this online transaction and batch database environment**

- **Comprehensive Disaster Recovery  ( DR ) – Included**
  - **A Twin IBM System z** mainframe operation, located at the University of Indiana, operating as disaster recovery warm site.
  - **Nearly Instantaneous Replication** of all disk and tape storage to DR operation in Bloomington, Indiana.
    - 140 TB of tape storage
    - 10 TB of disk storage
      - ✓ Includes separate semi-daily disk snapshots for a total of three off-site versions
      - ✓ Semi-Daily disk snapshots permit full Disaster Recovery event testing without impact to continuous live operation in Indianapolis; zero impact.
  - **Available three times each calendar year** for disaster recovery assurance testing
    - Hardware, Software and Operation included in the service rate.
    - DR testing services are a collaboration between the Agency, Mainframe Services, and Middleware Operational service teams organized, managed, conducted and documented by DR Project Management Services. Click here for additional Disaster Recovery information from IOT.
  - **Complete Network Access** to live or test DR operation from anywhere IOT Network services are found.
  - Recovery Time Objective (RTO – Downtime) - This requirement directs restoration of service 6 hours from the time the CIO declares an actual disaster upon advice from the Governor.
  - DR Recover Point Objective (RPO – Data loss) will be worked agency specific, as they may vary with the agency system
- **IBM's File Manager** - User friendly tools for comprehensive file management and data manipulation, working with many file structures and databases present or operating on the IBM System z mainframe.  Among File Manager capabilities is the definitions of files, browsing, editing, copying and printing of data stored in a variety of forms:

  | | |
  |---|---|
  | o Unix files | o IMS – Manipulate elements and data |
  | o Flat files | o Map record elements |
  | o Virtual Managed files (VSAM) | o Sort data |
  | o Indexed files | o Perform Sophisticated Comparisons |
  | o CICS Storage Resources | o Invoke REXX routines; Automation |
  | o DB2 – Various data and resources | |

- **Alert Services** for anomalous change in application system or subsystem operation delivered by eMail.
- **Report Distribution** – On-demand delivery directly from mainframe operation to network printers and eMail boxes in a variety of formats.
- **24 / 7 / 365 Support** – Continuous operational staffing for response to all operational needs.
- **Virtual Tape Library** -    No Mylar/Oxide tapes - High Reliability - High Performance - 140 TB
  Click **here** to access **Virtual Tape Library** service

| | |
|---|---|
| **Extended Services** | Available for development and customization to user specification without procurement. Arrangement by Service Owner. |

**Performance Metrics Reporting**

- Highly detailed and/or summarized reporting, delivered to customer inboxes, is available on a variety of performance, throughput and resource consumption metrics.  From transaction response time to data throughput, reporting demonstrates that SLA requirements, determined and agreed upon by IOT and the customer, are being met. Reporting is also available for customer application performance tuning.  A wealth of performance and throughput reporting is available.

| | |
|---|---|
| **Obtainable Services** | Available for procurement or development by arrangement of Service Owner. |

**Linux High Performance Hosting**

- Host Linux applications, application suites or databases on a high performance Linux operation, participating as a local or distributed operation.  When operating, this extended service Includes Disaster Recovery services.

**Application Program Interface**

- SOAP or RESTful API by JSON interface to existing or newly developed mainframe application operation.  Deliver APIs in HTTP to a variety of application services on any platform.

**API Management**

- Manage, deliver and secure APIs.

| | |
|---|---|
| **Rate** | **MOU -** A rate is no longer included as part of this product. Only a management fee to support the application on the system |
| **Service Owner** | Todd Baxter, Deputy Chief Operations Officer – *Click to email the Service Owner a question.* |
| **Standard** | **Not Applicable** |
| **Cust Resp** | A computer with network access, as needed.  IOT supports Blue Zone emulator software. |
| **Metric** | 99.9% Mainframe Availability 24/7 – IBM, IMS, DB2 – See **Reports** below. |
| **Impact/Priority** | High/High |
| **Lead Time** | ***None Required.***  Immediately available for operating mainframe application systems. |
| **Measurement** | Mainframe operating system IBM System z Operating System; z/OS Version 2 Release 2 |
| | IMS  ----  1.8  **B**illion Standard Business Day Transactions  (FY 2017) – 1.81 **B**illion Total |
| **Reports** | Monthly IOT Performance Metrics – Click here |
| **Dependencies** | None |

**Roles and Responsibilities**

1. **Operation**

   Maintain and monitor 24 / 7 / 365 operation of all mainframe services identified in this Service Catalog.  Maintenance and monitoring of operations include production of and response to automated notifications.

2. **Performance**

   Ensure all workloads, batch and transactional, are dynamically managed to agreed upon service levels established between the consumer and IOT.  Select workload elements are eligible to be singled out to be negotiated for special handling.  Produce performance reporting, as required, to demonstrate expected performance is being obtained.

3. **Staffing**

   a. **Operations**

   Provide on-site personnel on a 24 / 7 / 365 basis to conduct maintenance and oversight of workload scheduling.  Conduct observation of operational performance and throughput.

   b. **System Administration**

   Provide on-site personnel during normal business hours to conduct the entire scope of system administration duties.  Maintain a 24 / 7 / 365 on-call rotation to address anomalies discovered by Operations.

4. **Consumer Support**

    a. **Established Services**

Participate with or engage consumers with regard to use, operation, performance and cost control of all mainframe services identified in this Service Catalog

    b. **Prospective Services  –  Including Proof of Concept**

Participate with or engage consumers along a broad range of available information technology services.  Introduce available technology elements available in established services.  Introduce available technology as an opportunity to modernize, streamline and control cost as it relates to consumer missions.

5. **Maintenance**

    Conduct comprehensive maintenance tasks as a part of mainframe management in support of mainframe services identified in this Service Catalog.  Includes maintenance of application of hardware or software elements.  Includes least disruptive utility maintenance activities to ensure optimum performance.

6. **Vendor Support**

    Maintain vendor software and hardware support by ensuring hardware, operating system, subsystems and third party services, identified in this Service Catalog, remain within end-of-life spans.

7. **Cost Control**

    Manage and control consumption of consumer billable system resources to maximize information technology budgets.

8. **Change Control**

    Comply with established IOT Change Control standards, processes and schedules.

9. **Incident Management**

    ◉ Incident Management applies to all aspects of mainframe operation.

    ◉ Use established problem determination methods to identify cause of availability or performance impact.  Then, **restore** impacted service to consumer expected levels, circumventing impact as required or available with emphasis to restore expected service **As Soon As Possible**.

    ◉ Escalate through IOT management and administration as required.

    ◉ Engage and escalate with vendor support entities as required.

10. **Root Cause Resolution**

    Identify, resolve and report root causes for all performance deficiencies and out-of-service incidents.

11. **Disaster Recovery Engagements**  -  Click here for  information on IOT Disaster Recovery Services

    a. **Central Processor Complex:** Maintain 24 / 7 / 365 operational status of twin IBM System z in Bloomington, Indiana as a warm site for:

        i. Live Disaster Recovery Operation

        ii. Disaster Recovery Exercises

    b. **Data Storage; Off Site Synchronous Replication:** Maintain 24 / 7 / 365 replication of local *disk* and *tape* storage subsystem data to like storage subsystems in Bloomington, Indiana for Disaster Recovery purposes.

        ➢ **Disk Subsystem storage** replication provides Disaster Recovery warm site options as this replicated data is not qualified as not high availability.  This data is accessible by only the Twin IBM System z operation at the Disaster Recovery site.  In the case of an actual disaster, Disaster Recovery operation of the Twin IBM System z at the Disaster Recovery Site has the access to the replicated data on the Disk Subsystem to which it is connected in Bloomington, Indiana.

        ➢ Click **here** for description of high availability of access to **Virtual Tape** data.

    c. **Data Storage; Off Site Auxiliary Storage:**  Maintain two semi-daily snapshots of entire disk subsystem as an auxiliary DR safety net or for use during Disaster Recovery test events.

    d. **Testing:** Fully support Disaster Recovery exercises as required by consumers and managed by DR Project Management Services.  Maintain vendor contracts to ensure availability of three (3) Disaster Recovery tests each calendar year.

| | |
|---|---|
| **Name** | **CICS** |
| **Service Code** | 1209 |
| **Service Index** | **Transaction Server** |
| **Service Purpose** | **IBM's Customer Information Control System** – CICS Transaction Server |

- o   A First Class application transaction server
- o   Including operation of transactional Java applications – Node.js
- o   Utilization of SOAP and RESTful APIs  ( See Obtainable Services, here )
- o   Read more about the CICS Transaction Server here.

| | |
|---|---|
| **Extended Services** | Available for development and customization to user specification without procurement. Arrangement by Service Owner. |

**Performance Metrics Reporting**

- Highly detailed and/or summarized reporting, delivered to customer inboxes, is available on a variety of performance, throughput and resource consumption metrics.  From transaction response time to data throughput, reporting demonstrates that SLA requirements, determined and agreed upon by IOT and the customer, are being met. Reporting is also available for customer application performance tuning.  A wealth of performance and throughput reporting is available.

| | |
|---|---|
| **Obtainable Services** | Available for procurement or development by arrangement of Service Owner. |

**Application Program Interface**

- SOAP or RESTful API (JSON) to existing or newly developed mainframe application operation.  Deliver APIs in HTTP to a variety of application services on any platform.

**API Management**

- Manage, deliver and secure APIs.

| | |
|---|---|
| **Rate** | $0.0386 Per CPU Second |
| | **Explanation**: Product 1209 consists of the accumulated CPU seconds for all CICS transactions records found in the SMF Type 110 records which are generated from activity occurring on the mainframe.  Below is a description of this record type. |
| | **SMF Type 110 -** CICS Transaction Server - Transaction data collected at event monitoring points |
| **Service Owner** | Todd Baxter, Deputy Chief Operations Officer – *Click to email the Service Owner a question.* |
| **Standard** | **Not Applicable** |
| **Cust Resp** | A computer with network access, as needed.  IOT supports Blue Zone emulator software. |
| **Metric** | 99.9% Mainframe Availability 24/7 – IBM, IMS, DB2 – See **Reports** below. |
| **Impact/Priority** | High/High |
| **Lead Time** | ***None Required.***  Immediately available for operating mainframe application systems. |
| **Measurement** | Mainframe operating system IBM System z Operating System; z/OS Version 2 Release 3 |
| | CICS  ----  46.6  **M**illion Standard Business Day Transactions (FY 2017) – 47.2 **M**illion Total |
| **Reports** | Monthly IOT Performance Metrics – Click here |
| **Dependencies** | None |

**Roles and Responsibilities**

1.  **Operation**

Maintain and monitor 24 / 7 / 365 operation of all mainframe services identified in this Service Catalog.  Maintenance and monitoring of operations include production of and response to automated notifications.

2. **Performance**

Ensure all workloads, batch and transactional, are dynamically managed to agreed upon service levels established between the consumer and IOT.  Select workload elements are eligible to be singled out to be negotiated for special handling.  Produce performance reporting, as required, to demonstrate expected performance is being obtained.

3. **Staffing**

   a. **Operations**

Provide on-site personnel on a 24 / 7 / 365 basis to conduct maintenance and oversight of workload scheduling. Conduct observation of operational performance and throughput.

   b. **System Administration**

Provide on-site personnel during normal business hours to conduct the entire scope of system administration duties. Maintain a 24 / 7 / 365 on-call rotation to address anomalies discovered by Operations.

4. **Consumer Support**

   a. **Established Services**

Participate with or engage consumers with regard to use, operation, performance and cost control of all mainframe services identified in this Service Catalog

   b. **Prospective Services – Including Proof of Concept**

Participate with or engage consumers along a broad range of available information technology services. Introduce available technology elements available in established services. Introduce available technology as an opportunity to modernize, streamline and control cost as it relates to consumer missions.

5. **Maintenance**

   Conduct comprehensive maintenance tasks as a part of mainframe management in support of mainframe services identified in this Service Catalog. Includes maintenance of application of hardware or software elements. Includes least disruptive utility maintenance activities to ensure optimum performance.

6. **Vendor Support**

   Maintain vendor software and hardware support by ensuring hardware, operating system, subsystems and third party services, identified in this Service Catalog, remain within end-of-life spans.

7. **Cost Control**

   Manage and control consumption of consumer billable system resources to maximize information technology budgets.

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   ◉ Use established problem determination methods to identify cause of availability or performance impact. Then, **restore** impacted service to consumer expected levels, circumventing impact as required or available with emphasis to restore expected service **As Soon As Possible**.

   ◉ Escalate through IOT management and administration as required.

   ◉ Engage and escalate with vendor support entities as required.

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    Identify, resolve and report root causes for all performance deficiencies and out-of-service incidents.

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d.  **Testing:** Fully support Disaster Recovery exercises as required by consumers and managed by DR Project Management Services.  Maintain vendor contracts to ensure availability of three (3) Disaster Recovery tests each calendar year.

| **Service Name** | **IBM System z Mainframe Services – Network Database - IDMS** |
|---|---|
| | *High Performance / Large Scale / Highly Secure / High Volume Processing* |

**Service Code**     1210

**Service Index**     <u>24 / 7 / 365  Support</u>          **Alert Services**          **Disaster Recovery**
                     **JDBC / ODBC Service**

**Service Purpose**     **Full Support of Broadcom's I**ntegrated **D**atabase **M**anagement **S**ystem; IDMS.

- **Comprehensive Disaster Recovery  ( DR ) – Included**

  o **A Twin IBM System z** mainframe operation, located at the University of Indiana, operating as disaster recovery warm site.

  o **Nearly Instantaneous Replication** of all disk and tape storage to DR operation in Bloomington, Indiana.
    - 140 TB of tape storage
    - 10 TB of disk storage
      ✓ Includes separate semi-daily disk snapshots for a total of three off-site versions
      ✓ Semi-Daily disk snapshots permit full Disaster Recovery event testing without impact to continuous live operation in Indianapolis; zero impact.

  o **Available three times each calendar year** for disaster recovery assurance testing
    - Hardware, Software and Operation included in the service rate.
    - DR testing services are a collaboration between the Agency, Mainframe Services, and Middleware Operational service teams organized, managed, conducted and documented by DR Project Management Services. Click here for additional Disaster Recovery information from IOT.

  o **Complete Network Access** to live or test DR operation from anywhere IOT Network services are found.

  o Recovery Time Objective (RTO – Downtime) - This requirement directs restoration of service 6 hours from the time the CIO declares an actual disaster upon advice from the Governor.

  o DR Recover Point Objective (RPO – Data loss) will be worked agency specific, as they may vary with the agency system

- **Alert Services** for anomalous change in application system or subsystem operation delivered by eMail.

- **Report Distribution** – On-demand delivery directly from mainframe operation to network printers and eMail boxes in a variety of formats.

- **24 / 7 / 365 Support** – Continuous operational staffing for response to all operational needs.

- **Virtual Tape Library** -  No Mylar/Oxide tapes - High Reliability - High Performance - 140 TB
                                Click **here** to access **Virtual Tape Library** service

| **Extended Services** | **Performance Metrics Reporting** |
|---|---|
| | Highly detailed and/or summarized reporting, delivered to customer inboxes, is available on a variety of performance, throughput and resource consumption metrics.  From transaction response time to data throughput, reporting demonstrates that SLA requirements, determined and agreed upon by IOT and the customer, are being met. Reporting is also available for customer application performance tuning.  A wealth of performance and throughput reporting is available. |
| **Rate** | **MOU -** A rate is no longer included as part of this product. Only a management fee to support the application on the system |
| **Service Owner** | Todd Baxter, Deputy Chief Operations Officer *– Click to email the Service Owner a question.* |
| **Standard** | **Not Applicable** |
| **Cust Resp** | A computer with network access, as needed.  IOT supports Blue Zone emulator software. |
| **Metric** | 99.9% Mainframe Availability 24/7 – IBM, IMS, DB2, IDMS  –  See **Reports** below. |
| **Impact/Priority** | High/High |
| **Lead Time** | ***None Required.***  Immediately available for operating mainframe application systems. |
| **Measurement** | Mainframe operating system IBM System z Operating System;  z/OS Version 2 Release 3 |
| **Reports** | Monthly IOT Performance Metrics – Click here |
| **Dependencies** | None |