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Commonwealth of Kentucky Commonwealth Office of Technology Mainframe as a Service (MaaS) Implementation

Project Initiation: March 17, 2017
Project Completion: November 11, 2018

Project Sponsors:

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Commonwealth Office of Technology

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Executive Summary

COT began exploring options for Mainframe as a Service (MaaS) offerings with specific goals in mind:

- Align with State Budget Cost Reduction Targets
- Reduce Infrastructure Costs
- Provide Options for zPlatform
- Manage Risk and Capacity
- Streamline Mainframe Staffing
- Provide flexible billing options to support workload fluctuations
- Leverage SW Rationalization

Exemplar

The Commonwealth Office of Technology (COT) has relied on a mainframe platform as a core component of the Commonwealth of Kentucky IT infrastructure for over 40 years. The increasing rate of employee retirements in the workforce that specifically supported mainframe technologies coupled with rising mainframe hardware and software costs, compelled the investigation of alternative approaches including the availability of resilient cloud solutions.

Concept

Following the development and assessment of the business case for MaaS, COT collaborated with International Business Machines (IBM) and Executive Cabinet Agencies in 2017 to develop strategies and timelines to support the mainframe transition.

The transition was conducted using stage-gates with the first step ensuring IRS/SSA regulatory compliance (4/2017 through 8/2018). In test cycle 1, over 150 agency applications and interfaces were tested to ensure that they functioned the same hosted from the IBM data center as they did hosted from the COT data center. The second test cycle was a dress-rehearsal for go-live and extended testing to external interfaces.

Significance

COT's mainframe infrastructure hosts over 150 applications, while interfacing to over 110 Windows and UNIX servers within the COT Enterprise. As well as over 250 interfaces to Federal agencies and third party entities external to The Commonwealth's network.

Virtually all of Kentucky's Cabinets and their business applications that deliver critical citizen services rely on uninterrupted mainframe services.

Our partners across the United States rely on trusted and dependable interfaces.

Impact

The two primary goals that the Commonwealth achieved as part of this effort included:

- Relief from forecast personnel and budget shortfalls due to an aging workforce
- Real operational cost reduction to align with Commonwealth budget reduction goals

Following implementation and early analysis of financials, first year savings were on track. As a result, project scope was expanded to enhance middleware capabilities through the purchase and integration of Websphere/MQSeries tools.

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At the beginning of 2017, the Commonwealth had six staff remaining to maintain all system administration of the mainframe infrastructure. COT lost approximately 80 percent of staff from 2007 through 2017 due to attrition. The remaining COT staff was responsible for supporting, maintaining, and upgrading, 11 infrastructure areas:

- z/OS platform support
- Storage management
- z/OS print support
- z/OS performance and capacity management
- DB2 sub-system support
- IMS sub-system support
- CICS sub-system support
- WebSphere sub-system support
- MQ Series and Message Broker support
- Configuration management and automations
- z/OS console operations

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COT collaborated with Kentucky's Executive Cabinets and International Business Machines (IBM) in 2017 to develop strategies and timelines for a successful MaaS transition. IBM was asked to propose an implementation plan for the transition and migration of the Commonwealth's existing legacy mainframe capacity and components into a hybrid-managed IBM hosted solution with the following constraints:

- Kentucky desired a comprehensive business model (all financial infrastructure, labor, and IBM software components) bundled in a combined predictable financial model.
- It was assumed that IBM economies of scale (from other MaaS instances) would be passed on to the Commonwealth and,
- IBM would provide a unified billing and support framework over a five-year term.
- Additionally, all support was required to be US Based.

Based on the negotiated proposal for implementation and operation, roles and responsibilities were carefully defined to describe each party's responsibilities.

- Commonwealth Responsibilities:
 - Provide batch scheduling, production support, and RACF Security support
 - Provide and Control Print Operations
 - Provide both Logical and Physical DBA Function

- IBM Responsibilities:
 - Provide hardware, Direct Access Storage Device (DASD), Tape, and IBM software to support capacity on the IBM owned mainframe host. IBM to provide a fully managed support framework and predictable billing model
 - IBM to support the z/OS and base middleware
 - IBM to support State and Federal Audit Control
 - Installation and maintenance of Independent Software Vendor (ISV) products and middleware is included. COT is able to add ISV licenses to the MaaS contract as needed.

Beginning March 2017, COT and IBM defined stage-gates and carefully navigated them to ensure a successful MaaS deployment. The first step was to ensure IRS/SSA regulatory compliance that took 16 months (4/2017 through 8/2018). Upon meeting IRS and SSA compliance, we began testing of agency applications to ensure that they functioned the same hosted from the IBM data center as they did hosted from the COT data center. COT and IBM scheduled two test cycles with the flexibility to schedule a third if needed. During the first testing cycle, agencies were able to test 150 applications and interfaces within the mainframe and distributed systems. COT also provided working images of 110 Windows and UNIX servers to support the distributed systems hosting applications that interface with applications on the mainframe. Production services staff ran approximately 750 batch jobs (using abbreviated batch cycles) to move and process application data as well as a stress test the communications between distributed servers and the mainframe.

Network operations staff provided an isolated environment consisting of 30 networks and load balancing. COT and IBM established, tested, and implemented network connections between their respective CDC's and ADC's. We were able to schedule any issues we were unable to remediate during the first test cycle in the next testing cycle.

The second test cycle was a 12-hour window that was a "dress rehearsal" for IBM go-live preparedness. The agencies also had an opportunity to test interfaces to entities external to the COT network.. The window for external interface testing was narrow, but we were able to test connectivity to sites (private and secure) outside of the Commonwealth's networks with successful results.

Mainframe services were successfully transitioned to the IBM Boulder Colorado data center over the Veterans Holiday weekend of November 10, 2018. In February 2019, MaaS services participated in Disaster Recovery

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An interruption in service would produce significant degradation to citizen services. While the implementation risk was high, interruption in service as a result of inadequate technical staff was also high.

exercises with excellent results. IBM and COT successfully transferred all mainframe applications from the IBM Boulder Colorado data center to the IBM Research Triangle Park (RTP), Durham, North Carolina data center. COT and agency users reported successful testing of MaaS services during the Disaster Recovery exercises.

Although the business and economic benefits are not associated with one other item of significance, it is a point of pride for our teams and the Commonwealth of Kentucky. We were a first mover, among States, in the adoption of Mainframe as a Service.

Impact

The two primary goals that the Commonwealth achieved as part of this effort included:

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Following implementation and early analysis of financials, first year savings were on track. As a result, project scope was expanded to enhance middleware capabilities through the purchase and integration of Websphere/MQSeries tools.

There are several benefits to the Mainframe as a Service model:

1. The burden of hardware maintenance for the Z processor, disk and tape shifts to IBM.
2. IBM zCloud has a deep pool of Z talent that can maintain all components of COT's mainframe infrastructure.
3. Timely upgrades to new processors, disk hardware, tape hardware when it becomes available.
4. Keeping the z/OS up to date as well as all sub-system software and ISVs.
5. Providing active/passive DR recovery (and testing) to IBM's Research Triangle Park (RTP) data center in Raleigh, NC.
6. Maintain IRS/SSA regulatory compliance.
7. Reduced costs through IBM economies of scale.

COT and IBM built the MaaS program on a foundation of many goals, cost savings being a primary foundation. Over the life of the 6-year contract, the MaaS program was to reduce costs through three different mechanisms:

1. Staff reductions;
2. Better software licensing models through IBM partnerships; and,
3. Reduced/flexible hardware capacity, a consumptive model.

Following implementation and early analysis of financials, there appeared to be minimal risk to achieving our targeted \$7-10 million dollars of savings (for the project lifecycle). First year savings were on track. As a result, the project scope was modified (increased) to enhance middleware capabilities through the purchase and integration of Websphere/MQSeries tools. These enhancements were only possible due to the positive outcome of the baseline project. Additional financial analysis will require completion before we can claim these enhancements to be self-funded from the MaaS project.