



U.S. General Services Administration



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Office of Citizen Services and Innovative Technologies

Tools for Mapping Applications

Data Center Consolidation: Practical Use of Automation Technology

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1. Introduction

Enterprise application inventories have deteriorated over recent decades. As new applications, middleware, operating systems, and hardware are deployed, incremental consolidation is often postponed or neglected in favor of the expediency of getting new capability operational. This strategy has led to data centers that are increasingly difficult to update, modernize, or move because the collective applications eventually interact in ways that are difficult to maintain. The following table summarizes the problems, goals, and IBM approach to application discovery, analysis, and migration management.

Area	Problems	Goals	IBM Approach
Application Discovery (Inventory)	Large number of systems and applications, requiring significant manual effort with errors, time delays, and high personnel cost	Identify all applications, systems, and associated data for complete analysis and ongoing tracking	Discover applications, systems, and associated data; consider using the IBM Migration Factory's Data Collector Appliance (DCA)
Application Analysis	Many legacy applications and systems requiring difficult tradeoff decisions to sunset, migrate, or replace Complex interdependencies among applications and systems complicate complete analysis efforts	Establish an ongoing application management process to properly disposition applications, resulting in reduced inventory and cost, as well as satisfied users	Analyze data and generate design recommendations, suggested transition plans, and business case analysis; consider using the IBM Migration Factory's Analytic Engine (AE)
Migration Management	Large number of manual processes with many stakeholders, resulting in high cost, lengthy schedules, and unhappy users	Provide a highly automated, efficient process, resulting in appropriate application migration to cloud services (public, hybrid, or private) or traditional environments	Consider engaging the IBM Migration Team and using the Analytics Engine Design Report, Transition Plan, and Business Case Report to form the basis of their efforts

2. Description of Problem and Goals

The primary activities IBM uses for mapping applications (or application assessment) include application discovery, analysis, and migration management.

Application Discovery (or the creation of an application inventory) for a large enterprise is used to provide complete, reusable information about the application itself (code), the underlying systems, and related data, such as databases and scripts. Attempts to manually perform application discovery usually result in errors, time delays, and high personnel cost.

Application Analysis for large inventories usually results in difficult tradeoff decisions to sunset, migrate, or replace applications. Complex interdependencies among applications and systems complicate complete analysis efforts. The Government's goals should be to establish an ongoing management process to properly disposition the target applications, resulting in reduced inventory and cost, as well as satisfied users.

Migration Management has historically been a manual processes affecting many stakeholders and resulting in high cost, a lengthy schedule, and dissatisfaction for most users. The

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Government's goals should be to realize a highly automated, efficient process, resulting in appropriate application migration to cloud services (public, hybrid, or private) or traditional environments, primarily based on user requirements, security needs, and cost.

3. Description of Approach, Rationale, Results and Timeline

Capitalizing on its experience with consolidations and migrations over the years, IBM has developed the IBM Migration Factory, a combination of tools and expertise, to support consolidation and migration projects.

This powerful system of automation is applied during a three-phase process:

- **Application Discovery.** Automation in the discovery phase is accomplished using the Data Collector Appliance (DCA), a server-based integrated toolset that automatically gathers in-scope server and application data from the operating data center environment, collecting data across server systems and application images. The DCA scans the physical devices, server configuration, application information, and application dependency information from a central point of control. Automating the process drastically reduces the amount of time spent collecting the accurate and complete data necessary for analysis and migration planning. It considers application dependencies, version levels, operating systems, and infrastructure type and capacity. This approach to data collection positions IBM to provide a detailed and accurate analysis of the application environment, in preparation for the formulation of a cost-effective approach to consolidation and migration.

Central to the discovery task is IBM's Tivoli Application Dependency Discovery Manager (TADDM), which provides a detailed understanding of an enterprise's supporting infrastructure. Native discovery determines cross-tier dependencies and runtime configurations and reaches to the network and storage devices. TADDM provides detailed maps of business applications and their relationships to one another.

IBM developed the concept of a *discovery library* to ease the sharing of data across multiple applications through common specifications and the common data model (CDM). The CDM also includes reconciliation logic that corrects duplicate instances of the same item. TADDM's agent-free discovery engine manages the overall discovery process to collect the data needed to populate the CDM.

- **Application Analysis.** The second component in the toolset is IBM's Analytics Engine (AE), a server-based integrated toolset supporting analysis of the data collected in the discovery phase. The AE is used to consolidate, cleanse, and calibrate the comprehensive data scanned by the DCA, supplemented by data collected manually (financial data and application data not obtainable through scans), into a centralized data model. The AE then facilitates rapid and iterative analysis of the data, resulting in the creation of a consolidation and migration path best suited to the client's requirements, supported by a financial business case.

Together, the DCA and the AE automate critical delivery activities, reducing the cycle time and labor cost for gathering complete and comprehensive data; and for developing the right design, approach, and business case to support the consolidation and migration objectives.

The results of the consolidation and migration analysis are presented in a logical Design Report, a Transition Plan, and Business Case Report. These deliverables form the basis for subsequent physical design, move planning, detailed migration planning, and implementation of the consolidation and migration solution under the Planning and Implementation Services package.

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- **Migration Management.** IBM identifies the following attributes necessary to support a successful consolidation and migration project using the results achieved from the analysis and planning phase:
 - A well proven, standardized technical approach to multi-product consolidations
 - A staff of skilled, trained, and available personnel with significant knowledge, expertise, and experience in moving and consolidating data centers, applications, and associated databases
 - Readily available automated tools with appropriate staff proficiency
 - Management of the associated migration risks and costs

Based on those capabilities, IBM delivers a set of heterogeneous, application-centric server consolidation services designed to apply a standardized, consolidated methodology, and supporting tools and techniques to delivery of the migration solution.

Overall operations are monitored and reviewed for continuous improvement, underpinned by IBM's extensive experience in implementing program management and governance structures. This strategy ensures consistent, effective, high quality, and efficient execution across the solution's scope.

The timeline for the application discovery and analysis efforts varies from three to six months depending on the size of the infrastructure.

The following Federal Government case study presented describes an IBM consolidation project where substantial cost savings were achieved using the IBM Migration Factory Methodology.

Case Study: Classified US Government Client

Background: A US Government Client (USGC) contacted IBM about an opportunity to simplify and consolidate its IT infrastructure. With the perception that they were not fully using their environment, but with little information to support those claims, the client asked IBM to evaluate its infrastructure and make recommendations for improved efficiency and operations.

Business Need: The client was in the initial stages of optimizing its server infrastructure to reduce IT cost. However, before proceeding, the client needed visibility into the configurable items they had deployed in their data centers, including servers, operating systems, applications, network devices, and storage. The client needed information about how these items were interrelated, configured, how they had changed over time, and whether they were compliant with rules and policies. This knowledge would help the client assess the impact of a change before it was implemented—saving time, money, rollbacks, and preventing potential operational service disruptions.

The USGC began the server infrastructure optimization process using IBM's Migration Factory Methodology on a subset of its servers to capture and document the existing server relationships and identify opportunities for server consolidations and application migration.

This methodology included the following tasks:

- Collecting server and process identification and utilization information
- Analyzing the collected data for consolidation within the IT infrastructure and their related organizational and systems management components
- Developing recommendations for a cost effective consolidation and migration

The server environment was a mix of Linux, Solaris, SGI, and Microsoft Windows servers.

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Solution: IBM performed system discovery and system analysis on approximately 1000 servers. This analysis involved an iterative phased approach over a four-month period. The approach was divided into two parts:

Phase 1 - Discovery:

This phase included the discovery of physical servers, operating system, applications, network, and storage resources. The technical discovery consisted of installing Tivoli's Application Dependency Discovery Manager (TADDM) discovery tool, conducting a physical audit of the data centers, and collecting customer inventories and interviews with the application owners. The collected data was stored in a configuration management database.

Phase 2 - Analysis and Planning:

The discovered information was analyzed to identify system dependencies. Resource maps were developed for the operating system, network, and applications using IBM's Fit-for-Purpose methodology. The recommended re-hosting options were then determined. Approximately 600 devices were initially discovered (eliminating duplicate, rogue, and unused ones) with 400 of these devices targeted for migration.

Solution Benefits and Results: Analysis of the discovered information determined that of the approximately 300 of the 400 candidate devices slated for migration, a majority had a utilization of less than 15%, which allowed a dramatic reduction in servers from approximately 300 to 20. It was projected that the five-year Total Cost of Ownership (TCO) savings would be \$36M, based on industry standard costing models. Analysis results were captured in the Implementation Roadmap Report and a High Level Application Migration Project Plan. The automated tooling approach contributed to USGC's results by:

- Simplifying migration with specialized routines that further simplified the discovery and collection of middleware, database, and application configurations
- Providing informed accurate migration status and progress communications
- Automating server, middleware, and database provisioning speed cycle time to ensure consistent results
- Optimizing application configurations for the target platform
- Streamlining fast and efficient testing of migrated applications
- Using proven fully tested and validated recipes for provisioning, configuring, and migrating a variety of middleware, database, and other software products

Conclusion

We believe that the use of IBM's Migration Factory—an automated toolset coupled with an experienced migration team—will meet the Government's goals of an optimized suite of applications, yielding improved operations at lower cost.

4. POC and Vendor information

Robert Tozzoli
Federal Integrated Technology Lead
IBM Corporation
6710 Rockledge Drive, Bethesda, MD 20817
Email: rtozzo@us.ibm.com
Phone: (301) 367-2614