



IBM WebSphere Transaction Cluster Facility provides a high-performance, highly available, and highly scalable offering for large volume, online transaction processing

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At a glance

WebSphere® Transaction Cluster Facility (WTCF) provides:

- A high-availability, scaleable, high-performing, centralized, and persistent datastore for distributed programs:
 - Data is stored in DB2® in a unique fashion for increased performance.
 - Data caching supports fast read processing of critical, frequently accessed data.
 - Capabilities to cluster multiple WTCF nodes together sharing a single database image let you leverage the latest high-availability cluster technology from IBM® Power Systems™, AIX®, and DB2.
 - Leverages decades of IBM experience in online transaction processing systems and infrastructure.
 - Middleware is designed to support continuously available application workloads.
 - Delivers flexibility to run WTCF applications in any AIX environment, including in an WebSphere Application Server environment.
- Object-oriented API that is tailored for ease of development for transaction processing systems:
 - Unique data access, update, and indexing functions
 - Latest object-oriented programming concepts
 - Flexibility to code applications in C++ and Java™
 - Application development tooling to reduce time to market and ensure database consistency

Overview

WebSphere Transaction Cluster Facility V1.1 provides a high-performance, highly available, and highly scalable offering for large-volume online transaction processing (OLTP). WebSphere Transaction Cluster Facility (WTCF) is designed for applications that have large, centralized databases with demanding and frequent read and update requirements where data is not easily partitioned and must be globally consistent.

WTCF is built on IBM DB2 Enterprise Server Edition, which, with the DB2 pureScale® feature for Enterprise Server Edition, can provide a highly available

and scalable database solution for IBM servers (IBM Power Systems for the WTCF offering). WTCF is a distributed system based solution that is modeled on proven OLTP database technology from IBM to provide world class application performance, availability, and scalability. Coupling with the DB2 pureScale feature helps enable WTCF to leverage the server clustering technology for scalability and high availability. This combination of IBM middleware solutions provides the infrastructure for demanding transaction processing applications.

WTCF provides tools that help enable application programming development and system monitoring. This includes an Eclipse-based graphical user interface (GUI) that provides you with a way to create and maintain database definitions and to generate coding artifacts so that you can tailor applications specifically to the WTCF database. WTCF also leverages IBM Tivoli® Monitoring through a WTCF agent that allows specific WTCF measurements to be monitored in real-time.

WTCF is ideal for applications that are common in the travel and transportation industry as well as financial institutions where performance, scalability, and availability are paramount. WTCF is an IBM middleware solution that can provide an application interface for accessing persistent data objects and can be used by any application that requires fast response times and high availability, uses data that is not easily partitioned, and requires frequent updates. You can write applications to use WTCF data objects to create and maintain business-oriented databases that provide the backbone to the transaction processing environment of your enterprise.

Key prerequisites

For details, refer to the [Hardware requirements](#) and [Software requirements](#) sections.

Availability date

September 23, 2011 - Electronic availability

October 7, 2011 - Media availability

Description

WTCF is a workload optimized offering designed for mission-critical transactional workloads that require speed, high-transaction throughput, high availability, scalability to grow incrementally and smoothly, utilizing a shared and always consistent, single view of your operational business data. WTCF combines the most current IBM clustering, transaction, and database processing technology available on the IBM POWER® systems.

By developing WTCF for specific workloads, as opposed to providing additional capabilities like robust query support or analytic processing, IBM created an optimized system that delivers speed, performance, and efficiency not typical of most general purpose database offerings. The WTCF offering is derived from decades of experiences by IBM with meeting these workload demands on the System z® and z/Transaction Processing Facility.

Transaction processing optimized data structure

General purpose relational database offerings are robust and feature rich and their usages can be tailored based on a variety of application workloads. For example, you can use relational database technologies to support both online transaction processing (OLTP) applications and data warehouse and analytics applications, but how this is achieved entails making trade-offs.

Starting with the data schema, OLTP applications will typically utilize a normalized form (for example, third normal form or 3NF) to help ensure data integrity, whereas a data warehouse application will tend to utilize a denormalized, multi-dimensional data schema to support ad-hoc queries and data analysis.

Also, OLTP applications will typically utilize a small number of indexes to reduce the overhead of maintaining the indexes. This type of scenario can negatively impact performance depending on the number of indexes and the update rate, especially if the data will be updated at a high rate. In contrast, an analytics application will typically utilize many indexes to enable robust search query capabilities. This type of scenario does not incur high-index, maintenance costs because the data in a data warehouse tends to be updated much less frequently and typically in a batch or offline fashion. Just by looking at options for creating schemas and indexes, it is clear that relational database technologies provide many features and capabilities and it is important to understand that each of them have their limits and drive associated costs on the overall system.

With this perspective in mind, WTCF is optimized to support high-performance online transaction processing. By providing a non-relational means of creating a database of heterogeneous data types that are assembled in database structures optimized for transaction processing you can avoid many of the costs and processing inherent in trying to support these demanding workloads with more general purpose offerings.

Flexibility with heterogeneous data types

The focus of WTCF is to minimize path length to access data. This is done with layers of innovation beyond the typical programmable systems of today. WTCF provides flexibility in the data formats as well as the data organization within the data objects.

WTCF treats a data object as a collection of one or more records. Records provide the lowest unit of data within the WTCF database system. Multiple records of different types and formats can be stored within a single database object. This allows quick access to non-uniform data with minimal database accesses.

These composite objects easily allow for the processing of heterogeneous data as a single database entity. For example, a data object could contain a record that contains text, binary and alphanumeric data and also an index reference to access additional data, all in a single object. An application can fetch this collection of data efficiently in the networked data model and have the data it needs for a specific read or update transaction.

WTCF requires thoughtful design of the data structures, data formats, and the applications that use the database. The design is critical to building an environment for well performing transactions - especially during high-volume and high-data-update rates with interrelated data.

Customizable data structures

A common technique for dealing with applications that have demanding data requirements is to divide the data and employ large numbers of servers to attempt to satisfy the processing needs. Some workloads are not well suited to dividing the data because the data needs to be rapidly searched as a whole and critical data needs to be tightly synchronized with other data. This data, which is not easily subdivided, is referred to as interrelated or interdependent data.

The WTCF approach is to optimize the organization of interrelated data. Relational databases represent data in a standard relational table format made up of rows and columns. WTCF extends the row and column organization to be a structure of networked data. Networked data consists of pointer-based linkages that allow objects to have many-to-many relationships therefore not limited to relational or hierarchical data schemes.

This networked data model can provide efficient search paths for locating various data in the database. There can be multiple search paths to find and update data. This technique of data access is ideal for applications that have demanding data requirements such as those common in airline, rail, or hotel reservation systems where performance, scalability and availability are paramount. The WTCF data model

is based on decades of experience and ingenuity from z/Transaction Processing Facility (z/TPF).

Object-oriented for performance and productivity

The WTCF object-oriented interface, available to C++ and Java applications, helps enhance application performance and programmer productivity on DB2. Modern software architectures essentially require the use of object-oriented and service-oriented applications. Object-based applications offer a tremendous amount of flexibility, agility, and maintainability. Performance can be optimized when data is stored in a format that closely resembles the representation to the application.

Attempting to force an object-oriented construct on non-object-oriented data structures can lead to a cumbersome and poor performing solution. When database entities are stored as objects, there is no marshaling and de-marshaling of data that needs to be performed in order to transform between the relational database column and row data and the corresponding object representation. In this manner, little or no transformations need to be performed and an application can achieve maximum performance.

Multitenant capable

Multitenancy is an architectural principle in the realm of host and cloud computing that allows for multiple customers, or tenants, to share both hardware and software resources in an isolated and controlled fashion, whereby, to the tenants, it appears as if they are utilizing their own physically isolated resources. WTCF provides for multitenancy so that you can develop a single application code base with a corresponding WTCF database structure that can be used simultaneously by multiple tenants. The multitenant support in WTCF delivers the foundation for maximizing the utilization of your physical resources while also helping to reduce your ongoing development and maintenance costs of supporting multiple customers.

Code generation for programmer productivity and consistent access to data

In the network model of WTCF, linkages between database entities should be explicitly defined in advance for use by the business applications. WTCF provides an Eclipse-based, graphical toolkit to assist in this data design. This toolkit defines the data relationships and record formats for the database.

In addition to database definitions, the WTCF toolkit configuration assistant generates object classes to be included in the business applications for the access and update of the data structures in the database. This provides consistency of data access for all applications. The application development team can then focus on the business logic of the applications. The WTCF toolkit extends the tool environment for the developer and simplifies code development and maintenance to help improve application time to market.

Memory-cached, business-critical data objects

WTCF provides important runtime services for applications in addition to data organization and flexible data format options. One example is the caching of read intensive objects for maximum performance. The cache manager provides the ability for a member-specific main storage cache that can be accessed by multiple application processes connected to that member. The cache is well-suited for information that is read very frequently but updated infrequently. Infrastructure is also provided to allow for cache item synchronization across members in the cluster.

Runtime environment that helps ensure transaction integrity

WTCF helps you achieve maximum performance and to maintain transaction integrity across the various members of clustered systems. Applications using the WTCF middleware can read and write data and be confident they will achieve recoverable transactions. WTCF preserves transaction integrity in case members fail and recover in the cluster.

DB2 pureScale, the basis for WTCF

The DB2 pureScale feature is an option of DB2 Enterprise Server Edition and uses IBM PowerHA® pureScale technology to cluster servers together. DB2 pureScale feature uses a proven server clustering design adopted from decades of IBM experience from System z Parallel Sysplex® and DB2 for z/OS®.

DB2 pureScale feature uses a clustering of multiple servers for both scaling and high availability and provides a single, consistent view of the data across the cluster for both the reads and updates. The data is managed and exists as a single instance (with optional data redundancy provided at the storage layer) and each server in the cluster has access to the same data. DB2 pureScale feature uses a high speed InfiniBand data network to synchronize the database workload across the servers in the cluster. This interconnect allows DB2 pureScale feature to achieve cross server update rates on the order of microseconds, which is key to allowing WTCF to scale near linearly as additional servers are added to the cluster to support your growing workload demands.

Leveraging IBM software products

In addition to being built on DB2 and DB2 pureScale feature WTCF is designed for compatibility with other IBM software products. WTCF applications can be written in Java and run on WebSphere Application Server. Also, IBM Tivoli Monitoring can be used to report real-time statistics specific to WTCF by using a Tivoli monitoring agent developed for WTCF. These statistics help allow you to ensure the ongoing health of your system, and to indicate configuration adjustments that might be needed over time as your system grows to meet increased demands.

Accessibility by people with disabilities

A US Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be requested at

http://www.ibm.com/able/product_accessibility/index.html

Product positioning

WTCF is application infrastructure that supports demanding transactional workloads that require a clustered, shared-everything database and complements and extends the value of WebSphere Application Server and DB2 pureScale feature for transaction and database management. With WTCF, low-latency, scalable, and continuously available transaction applications that have the strictest transaction and data integrity demands can be better supported on distributed systems, namely IBM POWER Systems.

As the development of new Internet-scale applications continues driving the explosive growth of data and transaction volumes, the need to augment the traditional n-tier architecture with new forms of transaction and data management application infrastructure is large and immediate. Because of this, there was a proliferation of new database management systems (DBMS) sometimes referred to as "nonschematic" or "non-relational" DBMS, and the term "NoSQL", meaning "Not Only SQL", has emerged to describe this class of DBMS that are primarily focused on performance and scale and target specific problems or use cases like providing ad-hoc query support across a large, heterogeneous data sets.

As an example, in-memory data grids or distributed caching platforms like WebSphere eXtreme Scale have emerged and matured to enable extreme transaction processing (XTP)-style applications that are optimized to support massively scaled-out transaction processing, which can be applicable to many portions of Internet-scale applications. While WebSphere eXtreme Scale is ideal for partitioned scaled-out data sets, WTCF is targeted at the other end of the spectrum; at high value transaction workloads that require access to the entire database within the context of each individual transaction and cannot tolerate the latency associated with the alternative of partitioning the data across multiple database managers and

relying on traditional transaction processing monitor solutions. For workloads with these demands, such as airline inventory and reservation management applications, WTCF is optimized to provide robust qualities of service and a lower total cost of ownership.

WTCF provides the transaction application with the ability to construct network model databases which are quite different than relational databases. Between network database models and relational database models, or any other database model, it is not a question of which one is better for all uses but rather for which use is each one better, as each model has its associated strengths and weaknesses. A network model database is best used for particular mission-critical high volume transaction workloads that require the utmost in performance. Network model databases are more flexible than say hierarchical databases at providing multiple fast and efficient data access paths and they are also better able to support high volume updates to heterogeneous data records than relational databases.

Both hierarchical and network model databases can provide a performance advantage over relational databases when queries are known beforehand thus allowing the data structure to be optimized for these queries, but because for many applications it is not possible to know the queries in advance, relational databases flatten the data into independent tables with multiple indexes that can be queried and combined, to support ad-hoc queries, giving the relational model a significant advantage with regards to flexibility and ease of use for this particular use.

WTCF-based network model databases can coexist and be utilized by applications and systems that also utilize relational technology to develop optimum solutions. For example, WTCF can be used to store and manage mission-critical operational data in a network model, while also allowing this data to be extracted, transformed and loaded to relational databases to enable ad-hoc query and mining capabilities without impacting the transaction workload.

WTCF, which includes WebSphere Application Server, DB2, and DB2 pureScale feature, provides the application infrastructure to augment existing applications or create new applications that have rigorous transaction and data integrity requirements in a flexible, scalable efficient manner, helping to create a cost effective means of supporting mission-critical applications.

Program number

Program number	VRM	Program name
5725-E65	1.1	IBM WebSphere Transaction Cluster Facility

Offering Information

Product information is available via the Offering Information website

<http://www.ibm.com/common/ssi>

Also, visit the Passport Advantage® website

<http://www.ibm.com/software/passportadvantage>

Publications

No publications are shipped with this program.

IBM plans to publish the product documentation in an information center using the IBM Eclipse Help System framework.

Advantages of information centers are:

- Content is indexed by Google and other Internet search engines to help locate information more easily.
- Custom searches can be created that include only the information you need for a particular task or job role.

The WebSphere Transaction Cluster Facility Information Center will be available on September 23, 2011, at

<http://publib.boulder.ibm.com/infocenter/wtcfhelp/current/index.jsp>

You can access the WTCF product information in Hypertext Markup Language (HTML) format through the WTCF Information Center. The WTCF Information Center requires a browser such as Microsoft™ Internet Explorer 6.0 or later, or Firefox 2.0 or later. Support for cookies and JavaScript™ must be enabled in the browser to ensure that all functions in the Eclipse help system are available. Otherwise, some functions of the help system may not be available.

Technical information

Specified operating environment

Hardware requirements

The minimum hardware requirements is an IBM POWER6® or later generation of the IBM POWER processor

Software requirements

- DB2 considerations (installed on the AIX server)
 - DB2 Enterprise Server Edition V9.7 with Fix Pack (FP) 2
 - DB2 pureScale feature for Enterprise Server Edition for DB2 Enterprise Server Edition V9.8 Enterprise Server Edition V9.8 with Fix Pack 3 **Note:**DB2 pureScale feature is required for production,
- AIX considerations
 - IBM AIX Standard Edition V6.1 Technology Level 6 with Service Pack 3 or higher. If using a service pack level less than Service Pack 6, the interim fix for APAR IZ91804 must be applied.
 - Compiler: XL C/C++ for AIX V11.1
 - Runtime Environment: XL C++ RTE for AIX V11.1
- Windows™ considerations
 - Microsoft Windows 7
 - Microsoft Windows XP Professional with Service Pack 3 (SP3)

The WTCF Information Center requires a browser such as Microsoft Internet Explorer 6.0 or later, or Firefox 2.0 or later. Support for cookies and JavaScript must be enabled in the browser to ensure that all functions in the IBM Eclipse Help System (IEHS) are available. Otherwise, some functions of the help system might not be available.

The following software is optional:

- Tivoli considerations -- IBM Tivoli Monitoring V6.2.3, or later, if you plan to use the IBM Tivoli Monitoring agent for WTCF
- WebSphere considerations -- WebSphere Application Server V8, or later

The program's specifications and specified operating environment information may be found in documentation accompanying the program, if available, such as a README file, or other information published by IBM, such as an announcement letter. Documentation and other program content may be supplied only in the English language.

Limitations

For additional information, refer to [Usage restriction](#) in the [Terms and conditions](#) section of this announcement, or to the license information document that is available on the IBM Software License Agreement website

<http://www.ibm.com/software/sla/sladb.nsf>

Performance considerations

Not applicable.

Planning information

Direct customer support

Installation and technical support is provided by Global Services. For more information call 800-IBM-4YOU (426-4968).

For technical support or assistance, contact your IBM representative, IBM Business Partner, or visit

<http://www.ibm.com/support>

Packaging

WTCF contains:

- IBM International Program License Agreement
- License Information in multiple languages
Form number - L-LUNL-87QVW7
- Proof of entitlement

This program, when downloaded from a website, contains the applicable IBM license agreement and license information, if appropriate, and will be presented for acceptance at the time of installation of the program. For future reference, the license and license information will be stored in a directory such as LICENSE.TXT.

Security, auditability, and control

IBM WebSphere Transaction Cluster Facility uses the security and auditability features of the host hardware or software. The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communication facilities.

Software Services

IBM Software Services has the breadth, depth, and reach to manage your services needs. You can leverage the deep technical skills of our lab-based, software services team and the business consulting, project management, and infrastructure expertise of our IBM Global Services team. Also, we extend our IBM Software Services reach through IBM Business Partners to provide an extensive portfolio of capabilities. Together, we provide the global reach, intellectual capital, industry insight, and technology leadership to support a wide range of critical business needs.

To learn more about IBM Software Services or to contact a Software Services sales specialist, visit

<http://www.ibm.com/software/sw-services/>

Ordering information

This product is only available via Passport Advantage. It is not available as shrinkwrap.

Product category: Application Integration Middleware

Product Identifier	Description	Program number
IBM WebSphere Transaction Cluster Facility V1.1		5725-E65

Charge metric

Program name	Program number	Charge unit description
IBM WebSphere Transaction Cluster Facility V1.1	5725-E65	Processor Value Unit

Processor Value Unit

Processor Value Unit (PVU) is a unit of measure by which the program can be licensed. The number of PVU entitlements required is based on the processor technology (defined within the PVU Table by Processor Value, Brand, Type and Model Number at

http://www.ibm.com/software/lotus/passportadvantage/pvu_licensing_for_customers.html

and the number of processors made available to the program. IBM continues to define a processor, for the purpose of PVU-based licensing, to be each processor core on a chip. A dual-core processor chip, for example, has two processor cores.

Licensee can deploy the program using either Full Capacity licensing or Virtualization Capacity (Sub-Capacity) licensing according to the Passport Advantage Sub-Capacity Licensing Terms (see webpage below). If using Full Capacity licensing, Licensee must obtain PVU entitlements sufficient to cover all activated processor cores* in the physical hardware environment made available to or managed by the program, except for those servers from which the program has been permanently removed. If using Virtualization Capacity licensing, Licensee must obtain entitlements sufficient to cover all activated processor cores made available to or managed by the program, as defined according to the Virtualization Capacity License Counting Rules at

http://www.ibm.com/software/lotus/passportadvantage/Counting_Software_licenses_using_specific_virtualization_technologies.html

* An Activated processor core is a processor core that is available for use in a physical or virtual server, regardless of whether the capacity of the processor

core can be or is limited through virtualization technologies, operating system commands, BIOS settings, or similar restrictions.

Notes

Some programs may require licenses for the program AND what is being managed. In that case, the following applies: In addition to the entitlements required for the program directly, Licensee must obtain PVU entitlements for this program sufficient to cover the processor cores managed by the program.

Some programs may be licensed on a managed basis ONLY. In that case, the following applies: Instead of the entitlements required for the program directly, Licensee must obtain PVU entitlements for this program sufficient to cover the processor cores managed by the program.

A few programs on an exception basis may be licensed on a referenced basis. In that case, the following applies: Rather than obtaining entitlements for the activated processor cores available to the program, Licensee must obtain PVU entitlements for this program sufficient to cover the environment made available to the Referenced program as if the program itself were executing everywhere the Referenced program was executing, independent of the basis on which the Referenced program is licensed.

Express® and Workgroup programs may be licensed with maximum use terms. In that case, the following applies: The maximum authorized use terms and conditions for PVU licensed IBM Express and Middleware Programs can be found in the *IBM Express and Middleware Licensing Guide*.

Product description	Product number
IBM WebSphere Transaction Cluster Facility V1.1	5725-E65

Passport Advantage

Description	Part Number
IBM WebSphere Transaction Cluster Facility V1.1	
Per processor Value Unit (5725-E65)	
License + Software S&S 12 months	D0LEILL
Annual Software S&S Renewal 12 months	E0CUPLL
Software S&S reinstatement 12 months	D0LEJLL

Passport Advantage customer: Media pack entitlement details

Customers with active maintenance or subscription for the products listed are entitled to receive the corresponding media pack.

Media packs description	Part number
IBM WebSphere Transaction Cluster Facility V1.1 DVD Media Pack - English	BA125EN

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License Information form number

Program name	LI number
IBM WebSphere Transaction Cluster Facility V1.1	L-LUNL-87QVW7

The program's License Information will be available for review on the IBM Software License Agreement website

<http://www.ibm.com/software/sla/sladb.nsf>

Limited warranty applies

Yes

Limited warranty

IBM warrants that when the program is used in the specified operating environment, it will conform to its specifications. The warranty applies only to the unmodified portion of the program. IBM does not warrant uninterrupted or error-free operation of the program or that IBM will correct all program defects. You are responsible for the results obtained from the use of the program.

IBM provides you with access to IBM databases containing information on known program defects, defect corrections, restrictions, and bypasses at no additional charge. For further information, consult the *IBM Software Support Handbook* found at

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IBM will maintain this information for at least one year after the original licensee acquires the program (warranty period).

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Technical support of a program product version or release will be available for a minimum of five years from the general availability date, as long as your Software Subscription and Support (also referred to as Software Maintenance) is in effect. This technical support allows you to obtain assistance (via telephone or electronic means) from IBM for product-specific, task-oriented questions regarding the installation and operation of the program product. Software Subscription

and Support (Software Maintenance) also provides you with access to updates (modifications or fixes), releases, and versions of the program. You will be notified, via announcement letter, of discontinuance of support with 12 months' notice. If you require additional technical support from IBM, including an extension of support beyond the discontinuance date, contact your IBM representative or IBM Business Partner. This extension may be available for a fee.

Money-back guarantee

If for any reason you are dissatisfied with the program and you are the original licensee, you may obtain a refund of the amount you paid for it, if within 30 days of your invoice date you return the program and its PoE to the party from whom you obtained it. If you downloaded the program, you may contact the party from whom you acquired it for instructions on how to obtain the refund.

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Volume orders (IVO)

No

Passport Advantage applies

Yes, and through the Passport Advantage website at

<http://www.ibm.com/software/passportadvantage>

Usage restriction

Yes. For information, refer to the License Information document that is available on the IBM Software License Agreement website at

<http://www.ibm.com/software/sla/sladb.nsf>

Software Subscription and Support (Software Maintenance) applies

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IBM Operational Support Services - SoftwareXcel

No

Other support

Passport Advantage

System i Software Maintenance applies

No

Variable charges apply

No

Educational allowance available

Not applicable.

Prices

Business Partner information

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<https://www.ibm.com/software/howtobuy/passportadvantage/paoreseller>

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