



Matrix

Enabling Technology for OS/390 and z/OS

Concepts

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What is Matrix?

Matrix is a Virtual Space Administration, Tabling and Cross systems communications enabling tool. Programs that create public dataspace, perform cross systems communications, or perform cross memory activity, must run in supervisor state. In general applications programs run entirely in problem state and do not have access to these kinds of facilities. Matrix enables these mechanisms for applications program. Matrix uses an Applications Programmers Interface (API) program to translate the application requirement into a series of activities that Matrix can perform, to fill that requirement. Matrix enables sysplex wide communications for applications easily. Matrix functions may be invoked simultaneously by multiple applications from many different address spaces, or systems in a sysplex.

Matrix presents vast arenas of virtual storage as linear address ranges to applications programs. Programs view these as linear memory starting at address zero and proceeding byte by byte for the length of the memory.

Matrix provides a simple consistent interface to enable applications programs to control virtual space as a resource and to enable them to take advantage of extended storage addressing without any knowledge of the underlying principles.

Matrix provides analogues to all major file functions and can be inserted into an application by replacement of I/O function requests with Matrix function requests.

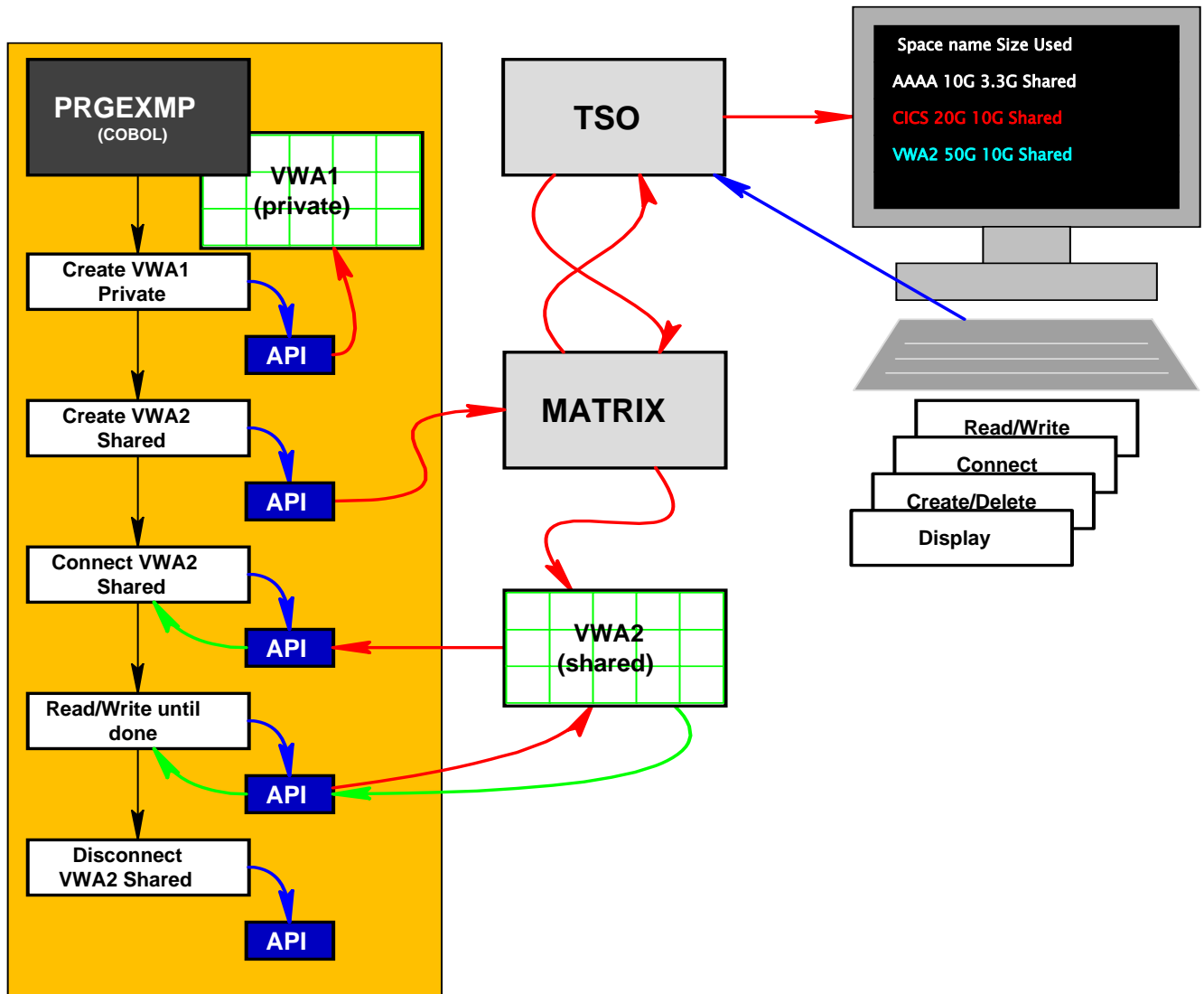
With Matrix, files may be preloaded for ultra fast access. The instruction path length to obtain data from extended memory is much shorter than the seek and access requirements for file I/O. This can result in dramatically improved access times shared files.

The OS/390 and z/OS based enterprise technologies were conceived to provide applications programs with almost unlimited storage and computing capacity, as well as security and reliability. Much of the power of the system is hidden from applications programmers. The applications programmer does not have access to many of the systems functions that make such things as data spaces and sysplex inter-systems communications possible. The simple API for Matrix will enable a programmer whose expertise is applications arena to use complex systems functions with enhanced performance without having to be retrained in MVS internals.

By providing simple secure access to almost unlimited data address ranges Matrix allows the applications designer to re-conceive the way in which applications operate. High level language applications programs may read, write and manipulate data in the user data spaces through a simple API.

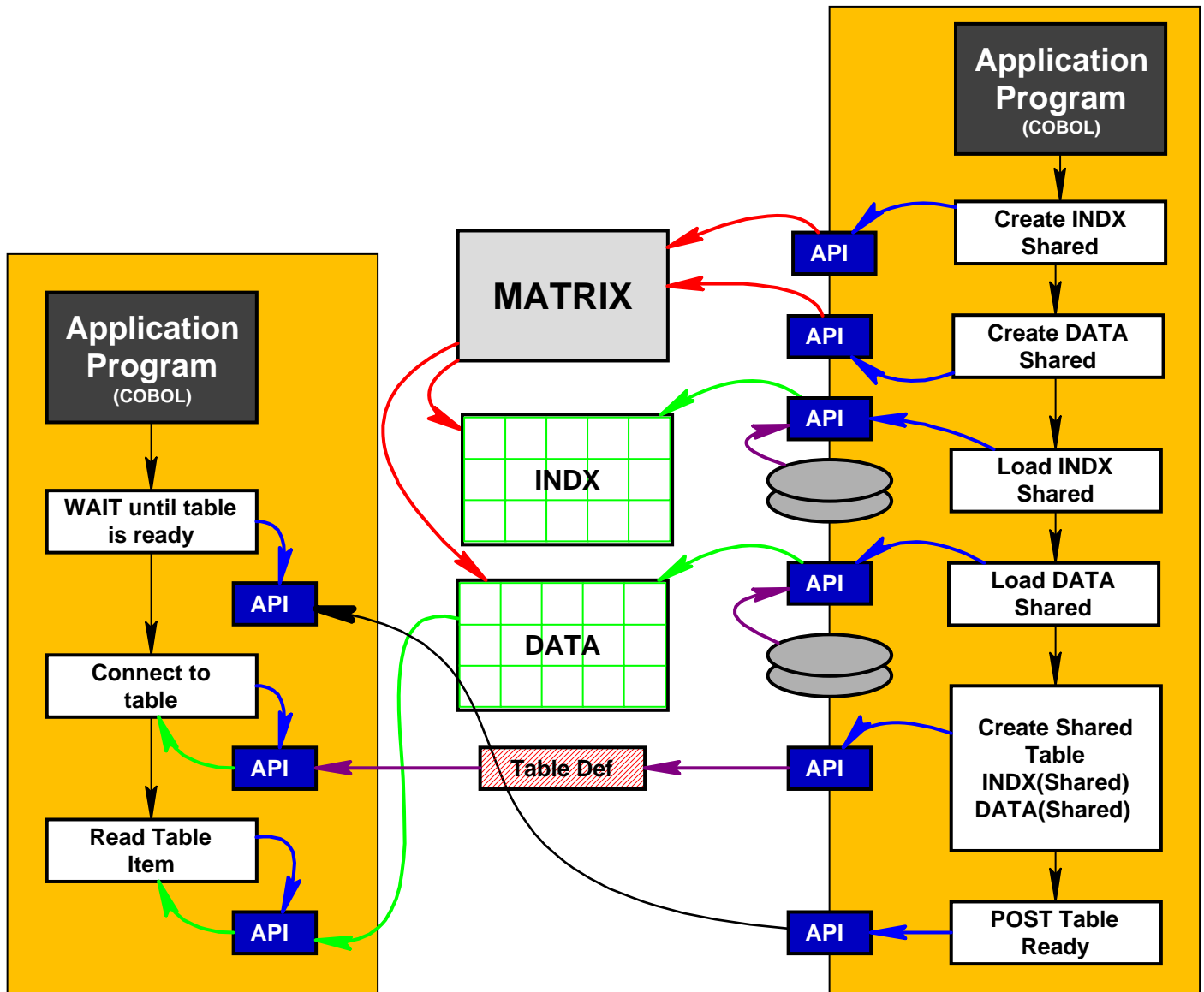
Virtual Space Administration

Matrix enables applications programs to view all of the virtual space available to them, as if they were any simply addressable storage location. Applications programs written in a high level language, such as COBOL, can use Matrix to control and manipulate multi-gigabyte regions of private and public virtual storage. TSO based tools allow the administrator to view and create large regions of dataspaces and partition them by name, so they can be made available to applications programs. Each named portion of virtual space is called a Virtual Work Area.



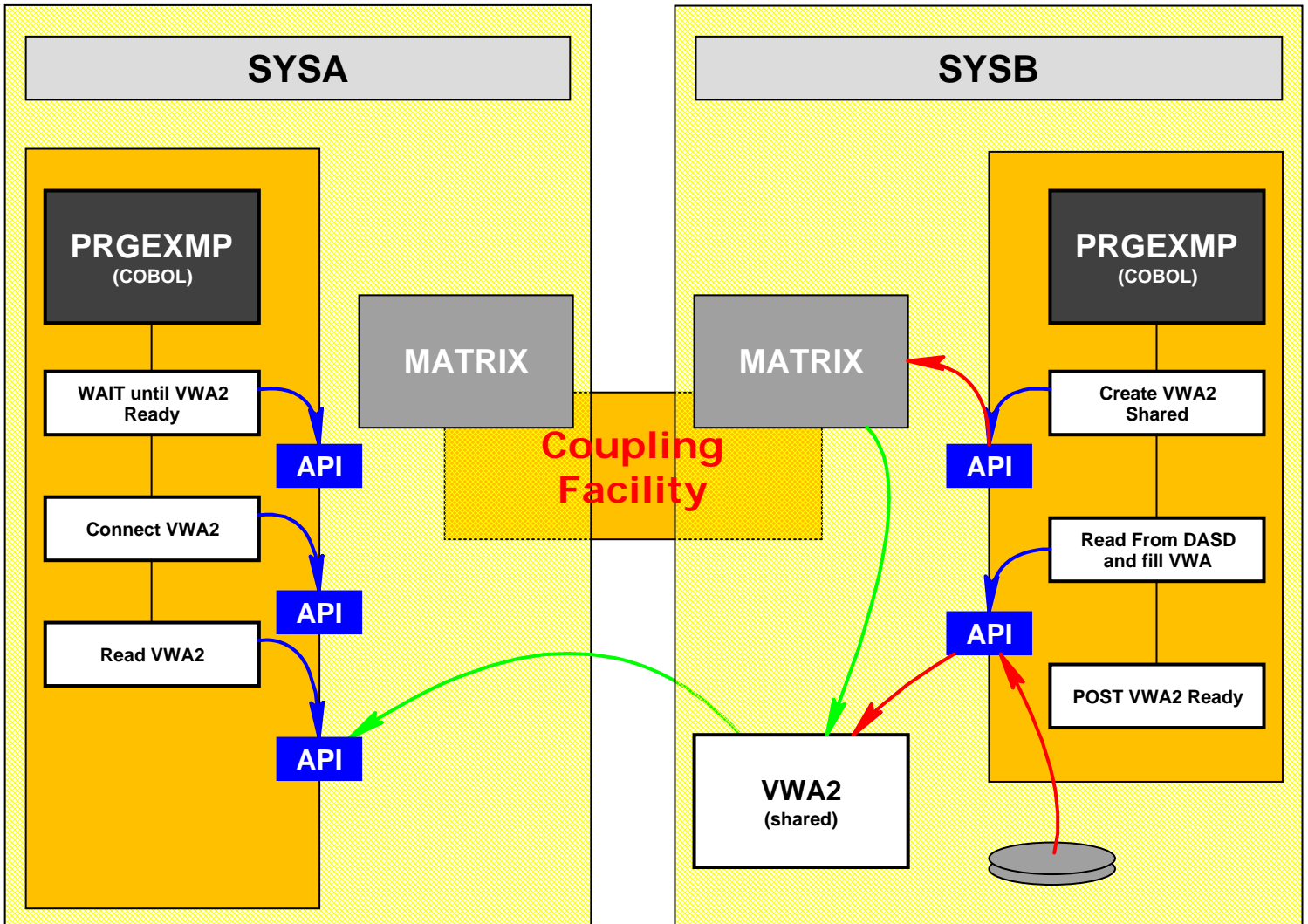
Tabling

The large areas of storage that Matrix controls on behalf of applications, can be logically divided into tables. The Matrix API provides a tabular look at the virtual space and enables applications to make direct table references to access and update data.



Cross systems communications

Matrix can be attached to the cross systems communications facility and it can then be used to allow applications, running in different systems in the sysplex, to communicate about space creation and use. Applications can read and write to virtual work areas held on other systems. This allows common tables to be kept and maintained on one system only.



What Matrix Enables

Matrix's mechanisms can be used to re-conceive the way in which applications software is developed and potentially improve its performance many fold. Matrix's mechanisms normally require complex authorized supervisor state "systems" programs. Matrix

enables these functions for applications programs without resorting to complex system programming and in-depth knowledge of MVS Internals

Authorized program requirements

All of the activities that Matrix must perform in supervisor state are completely masked behind the API and so no applications program should ever be APF authorized, or placed in an authorized library.

64 Bit memory mode removes applications memory constraints

Applications running on all versions of OS/390 or z/OS operate with an assumption that addresses will be up to 18 digits long.

Even a 24 bit program can use 64 bit addressable virtual space

Applications, that for historical reasons must run in 24 bit (below the line) mode, can use Matrix to get direct access to data in addresses that require 64 bits to express. All addresses and lengths are expressed as 64 bit numbers.

There are many heritage applications that could benefit from new storage technologies. Applications which have program residency constraints, such as those that must run below the 16Meg line, are limited in the memory resource they can allocate and manage.

With Matrix, these programs could have access to multiple Gigabytes of linear memory. Matrix will accept requests from programs in all addressing modes and from any programming environment.

Virtual Storage

Matrix can provide virtually unlimited addressing within the address space of the applications program. Matrix can also provide addressing to the same amount of common storage.

Multi-Gigabyte Virtual Work Areas

A Virtual Work Area is a block of named virtual storage. It could be entirely contained within one dataspace or it could extend over multiple dataspaces. The API user does not need to concern themselves with the internal arrangements, required to address any given piece of data. Matrix performs the translation so that the API user sees their piece of space arranged sequentially from address zero onwards, to its defined length.

Virtual Tables

Virtual Work Areas can be formatted into index and data portions of tables. Tables are a multi-dimensional cellular arrangement data. The data items are stored in cells and are referenced by indexes. For example a data item might be addressed as (2,4,6). This would then refer to 2nd row, 4th column, 6th entry. Tables may have fixed size cells or variable length cells.

Large scale data sharing

Files, tables and databases can be loaded into common Virtual Work Areas and be made available to all other applications programs.

The Matrix memory is shared and accessible to all applications. Multiple simultaneous CICS transactions can share tables with multiple varied batch programs.

You have shared files or tables that need to be refreshed regularly and you want to keep downtime to a minimum. Traditional method would include stopping transactions, read file into tables restart transactions

With Matrix, the new tables may be loaded into a work area and when ready just swapped with the old one. Down time can be kept to zero.

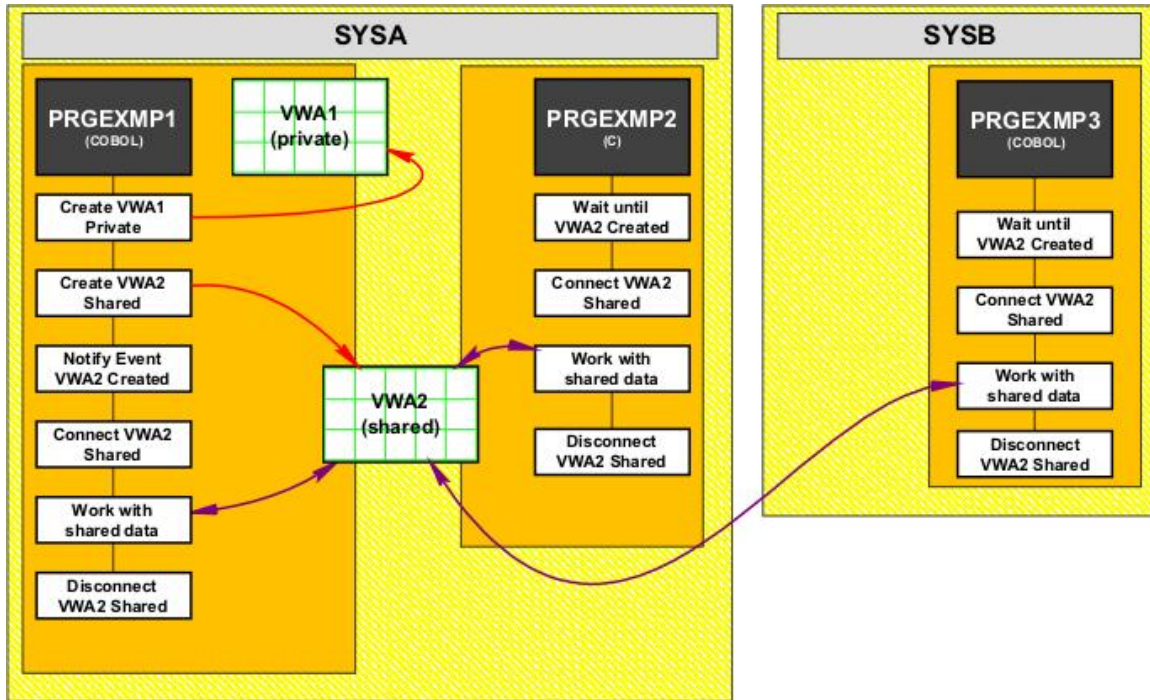
Large scale table management

The TSO and batch utility program tools allow you to specify names and sizes of Virtual Work Area that will be needed for production running. The tables can be preloaded from DASD, or, applications programs that make Matrix API calls can fill them.

Tables of common data can be loaded and applications can be notified when they are ready.

Sysplex applications and intersystems communications

Matrix contains all, of the infrastructure required to initiate and maintain cross systems communications with partner systems. Setting a start up parameter turns on intersystems communications. When cross systems operation is selected commands may be send to other systems to request services, and data transferred between virtual work areas on different systems.



Cross systems data space mirroring

When running sysplex enabled, virtual work areas may be defined as mirrored. Mirrored dataspaces are updated on all the systems that keep a local copy of that dataspace.

Cross systems event control

Matrix enables cross systems events. The Matrix WAIT and POST mechanism works in cross memory and cross systems mode. An event can be waited on, on one system, and posted active by another.

Parallel programming

Matrix enables multiple simultaneous and overlapping accesses to all of its facilities. Virtual Works Areas and tables could potentially be being hit by many tasks at the same time, both from inside the system it is running on and from partner systems.

Synchronous or Asynchronous

Some activities, such as for instance, loading a VWA from a file, are lengthy and could hold a calling program up until it is finished. If there is other work that could be usefully done while a long running task is in flight, the task can be requested to run asynchronously. This means that the task will continue to run at the same time as the requesting program continues.

Backing Memory

Some virtual work areas could be collecting potentially volatile information. These can be backed to disk. The virtual work area is then mapped as direct access pages and is written back when they are updated.

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