FINASTRA

Phoenix

Systems Infrastructure Design & Standards Guide

for In-House Deployment

March 2023

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Contents

Overview

This document provides a high-level overview of Phoenix In-House Deployment. Institutions in the early phase of evaluating Phoenix may use this guide to understand the architecture and costs that may be incurred during implementation.

Phoenix is a multi-tiered, .NET Framework-based solution that runs on a SQL Server database system. The system's infrastructure contains several components that are briefly described in this document. The core system and all related components are located on-site at the financial institution.

Associated Documents

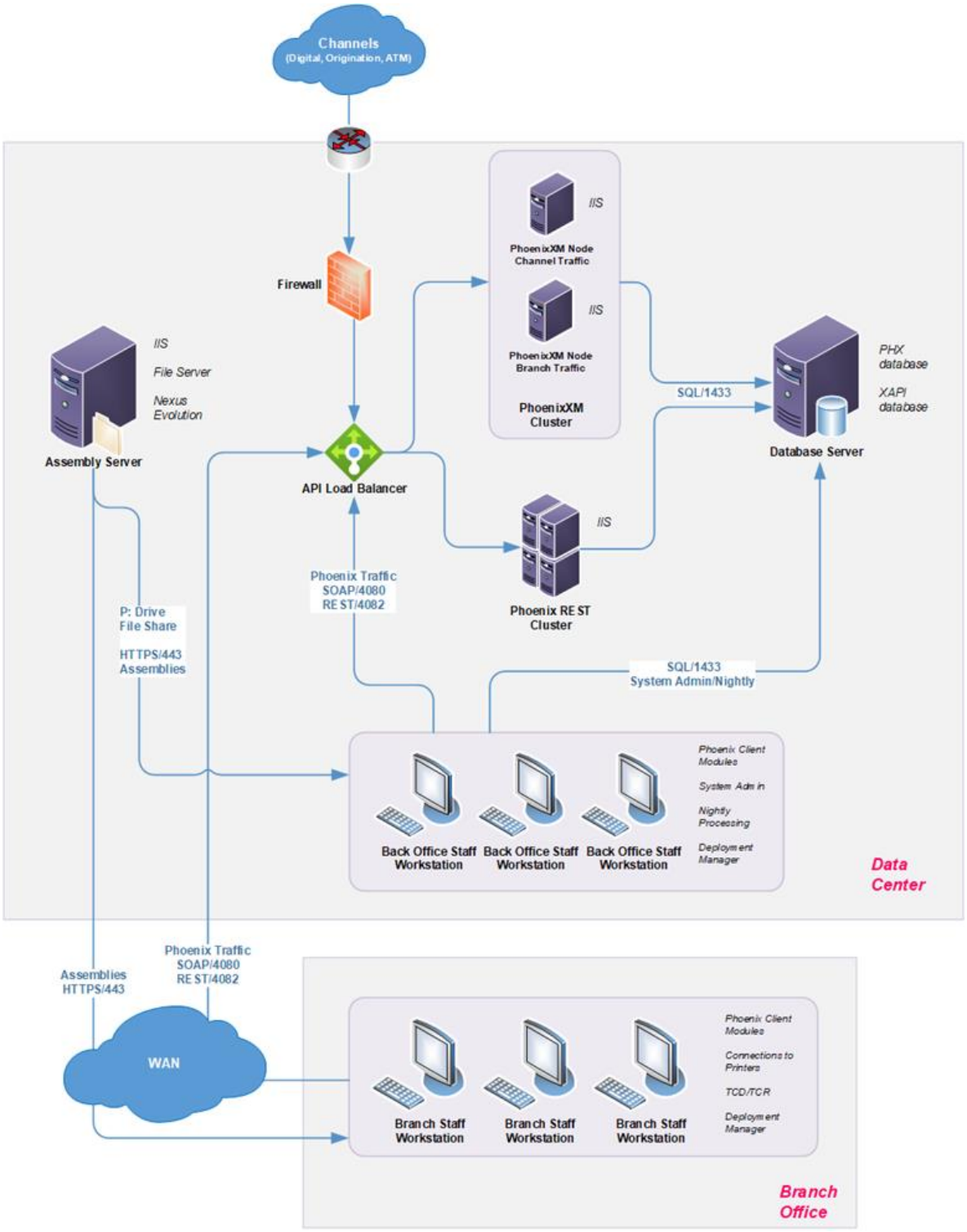
Refer to the following documents to supplement this document:

- Phoenix Platform Compatibility Matrix: Supported versions of Database Management Systems (DBMSs), operating systems, and other platforms used by Phoenix
- Nexus Evolution Supported Devices: Device compatibility list
- Compuflex Supported Devices: Compatibility for Teller Cash Recycler (TCR) and Teller Cash Dispenser (TCD) devices
- Phoenix REST API Documentation
- Phoenix Workflow Manager Installation Guide

Please contact your Finastra representative to obtain the documents mentioned above or any other documents referenced throughout this guide.

Deployment Topology

The following is a high-level overview of a sample in-house deployment of Phoenix components.



There are three main components at your primary location, such as a data center:

- Assembly Server
- PhoenixXM server cluster
- Microsoft SQL database server

Phoenix REST is deployed as a separate cluster to take advantage of Phoenix REST APIs.

Note: PhoenixXM cluster is internal-only and not public facing.

PhoenixXM and Phoenix REST cluster works with a load balancer to segregate traffic according to the purpose it is used for.. For example, you can send Branch traffic to one XM node and send Channel traffic to another XM node. Depending on the transaction volume you may vary your node allocation. It is typical to have 2-5 PhoenixXM nodes in a cluster.

More details on each component can be found in their respective sections in this document.

Server Virtualization

The Assembly server, PhoenixXM, Phoenix REST servers, and the Database servers can be virtualized. Virtual machine resource allocations must adhere to the minimum requirements listed for its respective server hardware.

Common hypervisors include VMware ESXi and Microsoft Hyper-V, but any hypervisor that supports deploying a virtual machine with Windows Server OS can be used.

Network Requirements

Any modern LAN infrastructure with at least 10Mbps available throughput between workstations and middle tier nodes can support Phoenix.

All traffic is TCP/IP and communicates on various ports. Please check with your implementation specialist on the specific ports that are required.

Azure Deployment

Instead of deploying Phoenix in your own in-house environment, you can deploy it in an Azure environment.

In such cases, Phoenix will run in your own Azure Tenant on Infrastructure-as-a-Service (IaaS) virtual machines.

Azure cloud can also be used as an option for development or staging environments, or for disaster recovery.

Note: We do not currently support Azure SQL Database.

Assembly Server

This section provides a conceptual sample of the system architecture. The preferred configurations are described below. Note that the actual hardware specifications may vary for each financial institution based on its specific needs and requirements.

The following Windows server must be provisioned at the Data Center or the Primary Site to support various functions for Phoenix. The server can be physical or virtual. Assembly servers are not required at branch offices.

The Assembly server supports the following functions:

- Maintain Phoenix assemblies: New Phoenix Release upgrade files for Teller and Member/Customer Management modules are staged on the Assembly Server, where the Deployment Manager Service can distribute them to your workstations.
- Provide Windows Server file share for System Administration and Nightly Processing.
  - System Administration supports administrative and operational functions of the financial institution.
  - Nightly Processing can be used to produce Phoenix core reports ad-hoc during the day, if needed.
- Configure teller receipt printing through Nexus Evolution. Nexus Evolution is the third-party software used for teller receipt printing. Nexus Evolution requires a SQL Server database on the Assembly server to store the teller receipt configuration. A SQL Server Express can be deployed for teller receipt printing.

While the above is a typical deployment, there are other options to deploy these components, including:

- System Administration and Nightly Processing may be deployed to your existing File Server.
- The Nexus Evolution database may use your existing Microsoft SQL Server database, instead of installing a SQL Server Express on the Assembly server.
- Notify your Finastra representative if you are using a third-party to host your IT infrastructure.

Please contact your Finastra representative to explore all the available options.

Hardware Requirements

Component	Minimum Requirement
Operating System	Refer to the Platform Compatibility Matrix.
Processor	2-core CPU minimum
Memory	8GB RAM
Storage	100GB We strongly recommend the use of hardware redundancy for fault tolerance.
Power	Servers must be connected to an Uninterruptable Power Supply unit or some other form of auxiliary power.

Database Server

Microsoft SQL Server is at the core of Phoenix. It is assumed that a knowledgeable database administrator is available at your institution to maintain the server. There are three databases associated with Phoenix:

1. Phoenix Database – All the account data, general ledger data, transaction data, teller data, card management data, customer/member and business relationships, and universal loan and universal deposit system data are stored here.
2. XAPI Database – It manages transactions during Phoenix upgrades and during Nightly Processing when the Phoenix database is unavailable.
3. Archive Database – Purged data is stored here and can be accessed using an ODBC-compliant application. This database is optional.

Server Requirements

A dedicated production server is required, with a second database server recommended for staging environments. Typical deployments include two staging environments (ST1 and ST2), as well as a third for Month End (ME). Other database servers can be used for additional environments, such as development and staging. There is no limit to the number of environments that can be added as required.

For server sizing recommendations, please contact your pre-sales representative for consultation.

High Availability and Disaster Recovery

Phoenix supports any High Availability (HA) / Disaster Recovery (DR) solution that works with Microsoft SQL Server. The following options based on cost and risk needs are popular with clients:

- Availability Groups
- Log Shipping

Database Backups Best Practices

Backups must be performed prior to Nightly Processing, and also after the Nightly Processing completes. It is recommended to stage backups to a disk, and then move it to long-term storage. Retention times are dependent on in-house policies taking into consideration the legal and compliance needs of your institution.

- If backups are not being stored on encrypted SAN, then it must be encrypted using TDE if stored locally or on a virtual server.
- Backups must be compressed for space requirements.

DBA Maintenance Best Practices

In addition to generic maintenance best practices, you can perform on your database the following maintenance items that are recommended at the specified interval specifically for Phoenix database housekeeping:

- Nightly update statistics
- Nightly recycles of SQL Server error log
- Nightly cleanup task for retention of job history
- Nightly audit job to ensure that all databases have set PAGE_VERIFY checksums
- Nightly audit job for SQL 2016, to ensure that it is utilizing all the optimizer changes that have been made by service packs (alter statements)
- Weekly Database Console Commands (DBCC)

- Weekly index maintenance
- We recommend that you use the latest available Microsoft SQL Server patches.

Database Purging through Phoenix Application

Purging involves removing obsolete data from your database. All data is purged through a configuration in the Phoenix application. We provide optimal recommendations for efficiency; however, it is up to your institutions' policies to determine the specific schedules and retention policies for purging to maintain compliance.

Additional Recommendations

- TLS 1.2 is the earliest supported version
- ODBC 13 is the earliest supported version and is required for TLS 1.2

Enterprise or Standard Microsoft SQL Server

Phoenix will run on Microsoft SQL Server Standard, but Microsoft SQL Server Enterprise may be needed depending on High Availability and Disaster Recovery selections.

Many clients select Enterprise for production and Standard for development or staging

Please refer to the Platform Compatibility Matrix for version information.

Database Upgrades

It is recommended to perform upgrades on your Staging environment first, then proceed to upgrade the Production environment after you are satisfied with the results of any testing.

Backups of databases must be made before and after upgrades.

After database upgrades are complete, the other Phoenix components may be upgraded.

Please refer to the Phoenix Upgrade Guide for In-House Clients for full upgrade procedure details.

PhoenixXM and Phoenix REST Server

PhoenixXM and Phoenix REST is the middle tier of Phoenix, where the business logic is applied, and provides a secure service gateway with access to transactions available in Phoenix, for third-party and first-party applications. PhoenixXM utilizes a combination of Web Services and XML as an API interface. Phoenix REST utilizes REST API calls with JSON as the request and response format.

PhoenixXM and Phoenix REST can be used simultaneously, but they must be deployed on separate servers. For each, a production server must always be deployed, and it is recommended that you deploy a separate server for staging and/or development.

These servers are capable of load-balancing but must be configured to support it correctly. Clients can separate traffic between branch and client traffic.

It is highly recommended that traffic to PhoenixXM and Phoenix REST is secured by TLS 1.2 for which ODBC 13 is required.

High Availability and Disaster Recovery

PhoenixXM and Phoenix REST are stateless and can be configured for load balancing. High Availability (HA) is typically achieved by having multiple PhoenixXM and Phoenix REST nodes and balancing load across them. It is also common for traffic to PhoenixXM and Phoenix REST to be

separated. A common approach is to separate branch/client traffic and vendor/third-party channel traffic. For instance, a pool of two PhoenixXM nodes may process all branch/client traffic, and a second set of two PhoenixXM nodes may process all vendor/third-party channel traffic.

Full Disaster Recovery (DR) data center has the same configuration to primary.

- HA is achieved by having multiple nodes
- DR is achieved with different options:
  - By having offline nodes through which traffic can be rerouted to during a disaster event.
  - By recovering PhoenixXM nodes. Full VM backups are required to support this.
  - You may follow a recovery model that is already in place at your financial institution.

Server Requirements

A single XM or REST node must meet the following requirements.

Increasing capacity should be done by scaling-out.

Minimum two nodes are recommended for High Availability and load balancing purposes

Component	Recommended Requirement
Operating System	Refer to the Platform Compatibility Matrix.
Processor	4 or more core server CPU
Memory	16GB RAM or more
Storage	100GB available space or more recommended

Phoenix Workflow Manager

Phoenix Workflow Manager is a component to Phoenix that allows users to automate and run standardized processes defined within your financial institution.

In addition to the Assembly Server already required for Phoenix, you will need the following additional two components to run the Workflow:

- Workflow Database – Tables are folded into the Phoenix database.
- XM.NET Web Service – Typically installed on the PhoenixXM server.

As Workflow is an Assembly application, the local Deployment Manager service polls the server at a specified interval, and assemblies are updated if there are changes in the files.

Detailed information on the installation process can be found in the Phoenix Workflow Manager Installation Guide.

Branch Workstations and Laptops

A Windows workstation is required to install Phoenix.

Finastra does not endorse any hardware vendor. Select a vendor based on your criteria, including support and perceived reliability.

Hardware Requirements

Individual workstations must meet the following minimum hardware requirements:

Component	Minimum Requirement
Operating System	Refer to the Platform Compatibility Matrix.
Processor	A modern multi-core CPU
Memory	4GB RAM minimum 8GB RAM or more recommended
Storage	10GB available space or more recommended

Software Requirements

The following software is either required or recommended for Phoenix to function on end-user workstations.

- Operating System and .NET
- Deployment Manager
- Teller Receipt Printing
- Phoenix Outlook Integration
- Offline Teller

Operating System and .NET

Phoenix requires a Windows client Operating System with Microsoft .NET Framework.

Refer to the latest version of the Phoenix Platform Compatibility Matrix for supported versions of:

- Microsoft Windows Operating System
- Microsoft .NET Framework

Deployment Manager and Command Center

Phoenix provides a Windows service and Deployment Manager that is installed on all workstations and laptops. When Phoenix is updated, Deployment Manager downloads the updated assemblies from the Assembly server and uploads them to each workstation or laptop.

Command Center allows the system administrators to view and manage information about your workstations in your Deployment Manager environments, such as version of local assemblies, communication status with the server, host information, and more.

Command Center can be hosted on the Assembly server as an IIS website with a small SQL database backend that can be installed on an existing SQL Server of your choice.

Note: Both Deployment Manager and Command Center are optional, but most clients prefer to perform updates using this software. Your institution can leverage other software distribution applications to update assemblies on workstations. Additionally, Deployment Manager is not needed if a desktop virtualization platform, such as Citrix, is used.

Alternatives to Deployment Manager and Command Center include any package distribution of your choice, for example IBM BigFix, or PowerShell scripts.

Teller Receipt Printing

Teller receipt printing uses the third-party software Nexus Evolution. Nexus Evolution consists of the following three primary components.

- Nexus Evolution ECU: Software to configure workstation and receipt printers. Installed on the Assembly as described earlier in this document.
- SQL Database: Tracks configuration changes. Installed on the Assembly server as described earlier in this document.
- Nexus Evolution Client Service: This is installed on each workstation. It receives configuration information from Nexus Evolution on the Assembly server.

Outlook Integration

Integration with Microsoft Outlook is achieved on a client workstation through a COM Add-in. If you are using Office 365, please note that this is not a Web Add-In, and will not work with the web-based version of Outlook. However, Office 365 users can still take advantage of the integration with a locally installed version of Outlook.

The following components must be installed on workstations running Phoenix Outlook Integration:

- Microsoft Office Redistributable Primary Interop Assemblies
- Microsoft Office

Go to the latest Phoenix Platform Compatibility Matrix and navigate to the Workstation/Client section for supported Microsoft Office version information.

Note: Phoenix Outlook Integration is optional.

Offline Teller

If Phoenix Teller loses connectivity with your database server, a message is displayed prompting tellers to work in an offline mode. Tellers can then temporarily post transactions to an offline database that exists on the teller workstations to later forward the transactions to the main database. After the system transitions to offline mode, tellers can continue to:

- Post transactions
- Use the online calculator
- View their teller journal of offline transactions
- View their teller summary position
- Batch totals
- Perform adjustment transactions
- Balance and closeout drawers
- Utilize the savings bond redemption calculator

Offline Teller works by temporarily posting transactions to a SQL Express database that is installed on each teller workstation. Refer to the latest version of the Phoenix Platform Compatibility Matrix for SQL Express support.

Note: Offline Teller is optional.

Desktop Virtualization

In the context of Desktop Virtualization, a thin client is an end-user device used to connect to a remote server which handles all processing, storage, and running software and operating system. It can be either a proper thin client, which is comprised of merely a monitor, keyboard/mouse, and a network connection to connect to the remote server, or a functional thin client, which is a full workstation complete with an operating system and software installed on local storage but is only used to access a virtual desktop from the remote server its connected to. In both cases, data is never stored or processed on the local machine.

In general, Phoenix may work with several technologies to virtualize desktops.

- Citrix Virtual Desktops (formerly XenDesktop)
- VMware Horizon (formerly VMware View)

Active View Teller Capture and Driver's License Scanners are NOT supported on Desktop Virtualization solutions.

Note: The thin client server must be separate from all other on-site servers.

Teller Receipt Printing

Teller Receipt printing using Desktop Virtualization requires one of the following deployments:

1. Nexus teller receipt print drivers deployed on the workstation. Typically, this deployment is used when desktop virtualization is deployed on a full workstation, and the printers are connected through a USB.
2. A Print Device server. Typically, this deployment is used when the printers are connected through Ethernet.

Print Device Server Hardware Requirements

The print device server is used for Teller printing in a thin-client environment using the Nexus Evolution software. The print device server handles the print requests from the thin-clients and routes them to the Teller printers. One print device server is recommended at the primary financial institution site.

This configuration is currently supported only for Citrix/Terminal server environments with Ethernet printers. Each print device server can handle no more than 20 users and 20 print devices.

The print device server is a lightweight server acting as an intermediary between the thin-clients and the print devices. As such, a PC can fulfill the requirements of a print device server.

Component	Minimum Requirement
Operating System	Refer to the Platform Compatibility Matrix.
Processor	2-core CPU
Memory	8GB RAM

Storage	10GB of free hard disk space

Statements, Reports, and Notices

This section is relevant only if you select to print statements, reports, and/or notices in-house. If these functions are outsourced, then the following information is not applicable.

As Phoenix is a Windows based application, it must be able to work with all laser printers that are certified for use with Microsoft Windows. Unless a printer is Windows compliant, Finastra makes no guarantees as to its compatibility for financial institution related print functions.

Notes:

- All Phoenix reports, notices, checks, and statements are designed for laser printers.
- All Phoenix report output is designed and tested for use with the HP PCL5 Basic Driver.

Finastra Integrated Products – Server Requirements

Information regarding on-site server requirements for each product within Universal Banking. If a product is listed as "Hosted," there may still be additional server requirements on-premises. Column information represents the standard implementation for each of these products.

NOTE: *For more information, please contact your pre-sales representative, and refer to the respective product documentation.*

Product Name	Deployment Model	Onsite Server Requirement	Virtual	Shared Server	Additional Notes
Phoenix	Hosted	1 required	✓	No – see notes	Optionally, Phoenix can be In-House (additional servers required) Onsite server should only house Phoenix components
DepositPro/EDO	On-Prem	1 required	✓	Yes – see notes	Can reside on any shared server other than CQ
OpenPath	On-Prem	1 required	✓	Yes – see notes	For use with ProSign Online with Phoenix EDO Used by CQ, DCP, and LP to communicate with all 3rd party vendors Can reside on any shared server

Product Name	Deployment Model	Onsite Server Requirement	Virtual	Shared Server	Additional Notes
ECM	Hosted	None	N/A	N/A	Optionally, ECM can be In-House (2 servers required)
Fusion Analytics (FA)	Hosted	None	N/A	N/A	
Card Payments	Hosted	None	N/A	N/A	
Item Processing (IP)	Hosted	None	N/A	N/A	
Originate	Hosted	None	N/A	N/A	
Digital Banking	Hosted	None	N/A	N/A	
CreditQuest (CQ)	On-Prem	2 required	✓	Yes – see notes	CQ and DCP app servers cannot reside on the same server. Database can be installed on any SQL server.
DecisionPro (DCP)	On-Prem	2 required	✓	Yes – see notes	DCP and CQ app servers cannot reside on the same server. Database can be installed on any SQL server.
LaserPro (LP)	On-Prem	1 required	✓	Yes – see notes	Can reside on any shared server other than CQ.
RapidWires	Hosted	None	N/A	N/A	Thick client to be installed on end-user workstation. Transaction limit of 3000 wires per month and supports FedWire.
Payments to Go	Hosted	None	N/A	N/A	Unlimited wire transactions. Supports FedWire, SWIFT, ACH, Real-time Payments, and Callers and Caller Passwords.
Treasury (Opics)	On-Prem	2 required 1 optional	✓	Yes - recommended	Hosting available is only through a partner.

Product Name	Deployment Model	Onsite Server Requirement	Virtual	Shared Server	Additional Notes
					Environment must be replicated to DR and UAT sites.

Finastra Support

Finastra support offers several options to help you get the most out of your software, including a self-service Case Management tool, and phone support.

Please visit the Finastra Customer Success Community at https://support.finastra.com to log in to our online self-service Case Management system. If you forgot your password, simply click the Forgot Password link. Once logged in, you have the ability to use the Finastra Customer Success Community to troubleshoot issues and find answers to questions.

If your financial institution is not currently using these tools and would like to, please contact Finastra support for assistance.

Note: The Financial Modernization Act of 1999, also known as the Gramm-Leach-Bliley Act or GLB Act, includes provisions to protect consumers' personal financial information held by financial institutions. Therefore, Finastra support cannot accept data or screen captures that contain personal financial information via email or fax. For information about secure file transfer methods, contact Finastra support.

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