Introduction

The N-Squared Voucher Server (N2VS[1]) is a software system for the management and real-time redemption of printed and virtual/on-demand vouchers.

The N2VS solution leverages a modern NoSQL database engine, data sharding, and replication to provide both high availability and linear horizontal scalability. Deployed on Linux and commodity x86-64 hardware, N2VS provides a robust solution with both low hardware and minimal third-party licensing costs. The result is a cost-effective deployment which can be easily scaled in response to future business growth.

The base configuration of N2VS supports the storage of up to 20m vouchers and up to 300 transactions per second. The solution can be scaled with the addition of further hardware nodes.

Vouchers are generated in batches that are assigned redemption details and an (optional) cost based on a Voucher Type. Voucher PINs are generated and encrypted using configurable hash functions, and when exported for distribution may be encrypted using public/private key encryption.

The Voucher Server integrates with third-party systems via the N2VS RESTful API and (when deployed with the N2IWF) telecommunication protocols including Diameter. Supported voucher redemption scenarios include:

1. Voucher redeemed by pre-existing PIN (e.g. pre-printed voucher).
2. On-the-fly PIN generation, and e-Voucher redemption without PIN.
3. Voucher Type redemption against an account without a PIN.
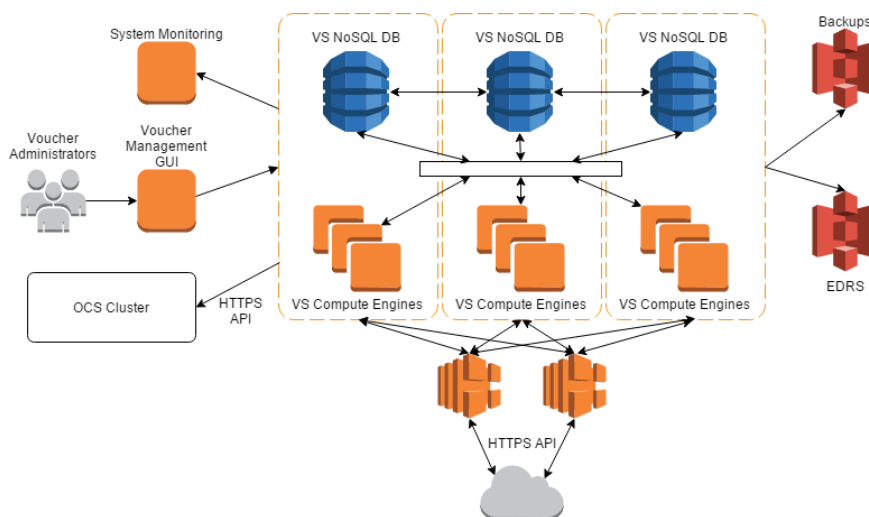
Architecture

Figure 1: N2VS High Level Architecture

The N2VS can be deployed either in-premises and self-hosted, or cloud-based as a third-party virtualized solution. Clustering across multiple mid-range servers provides high-availability through data replication and redundancy at an optimum price/functionality.

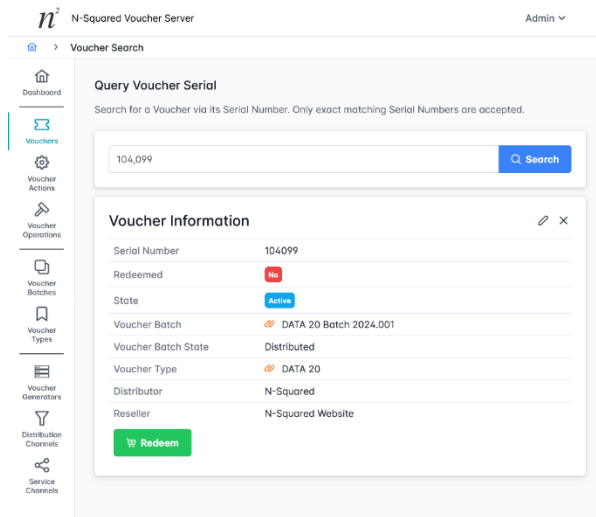A complete RESTful HTTP API provides the integration point for upstream BSS components.

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[1] https://nsquared.nz/product/n2vs.html

Figure 2: Voucher management GUI

Voucher Management Features

The N2VS stores voucher details and supports features for scalable and secure voucher management.

Features include:

- Voucher Types with optional OCS properties.
- Secure one-way hash encryption.
- Serial numbers for voucher tracking.
- Extended voucher attributes.
- Distributor and reseller tracking.
- Customisable voucher lifecycles.
- Multiple distribution channels.

Voucher Redemption

The N2VS integrates with third-party systems for voucher redemption.

During redemption, the voucher server reserves the voucher, redeems the value of the voucher against the appropriate account, then commits or rolls back the voucher reservation. Voucher redemption is transaction-safe against re-use or accidental loss-of-value.

Additionally, the value of a Voucher Type can be redeemed against an OCS account without a voucher.

User Interfaces

The voucher server includes a web-based GUI for voucher management, including the ability to:

- Create and maintain Voucher Types.
- Generate, export, and encrypt Voucher Batches.
- Import externally generated Voucher Batches into the voucher server.
- View and update Voucher status.
- Update extended Voucher attributes including distributor information in bulk.
- Voucher and Voucher Type redemption against OCS accounts.
- Login access to the user interface via Active Directory, OAuth 2.0, and other AuthN services.

Extensibility

The N-Squared Voucher Server offers multiple extensibility hook points, including configuration for standard features, scripting for advanced functionality, and programmable plugin hooks for 3rd party OCS integration and voucher distribution.

Other Features

N2VS provides all key management features, including:

- Generating file and non-file based EDRs for administrative and voucher redemption events.
- Publishing statistics to external third-party monitoring tools such as Prometheus.
- Generating alarms to system logs on unexpected errors.