

N-Squared High-Performance Proxy

Introduction

The N-Squared High-Performance Proxy (N2HPP) is a robust, flexible solution for the intelligent relay and manipulation of messages between client and server endpoints for Diameter, SMPP, and HTTP.

Built for high TPS and low latency service environments, the N2HPP scales to handle thousands of transactions a second per virtual machine. Able to be deployed as individual or clustered nodes, the N2HPP supports multiple HA deployment patterns out of the box.

With its first-class support for customized functionality, unique site-specific features can be developed within Lua where accessible, dynamic iterative development is important, or in the JVM core, when performance is most critical.

Built-in support for message transfer through Redis allows the N2HPP to integrate with IT systems and external scripts without direct knowledge of the proxied protocols.

Architecture

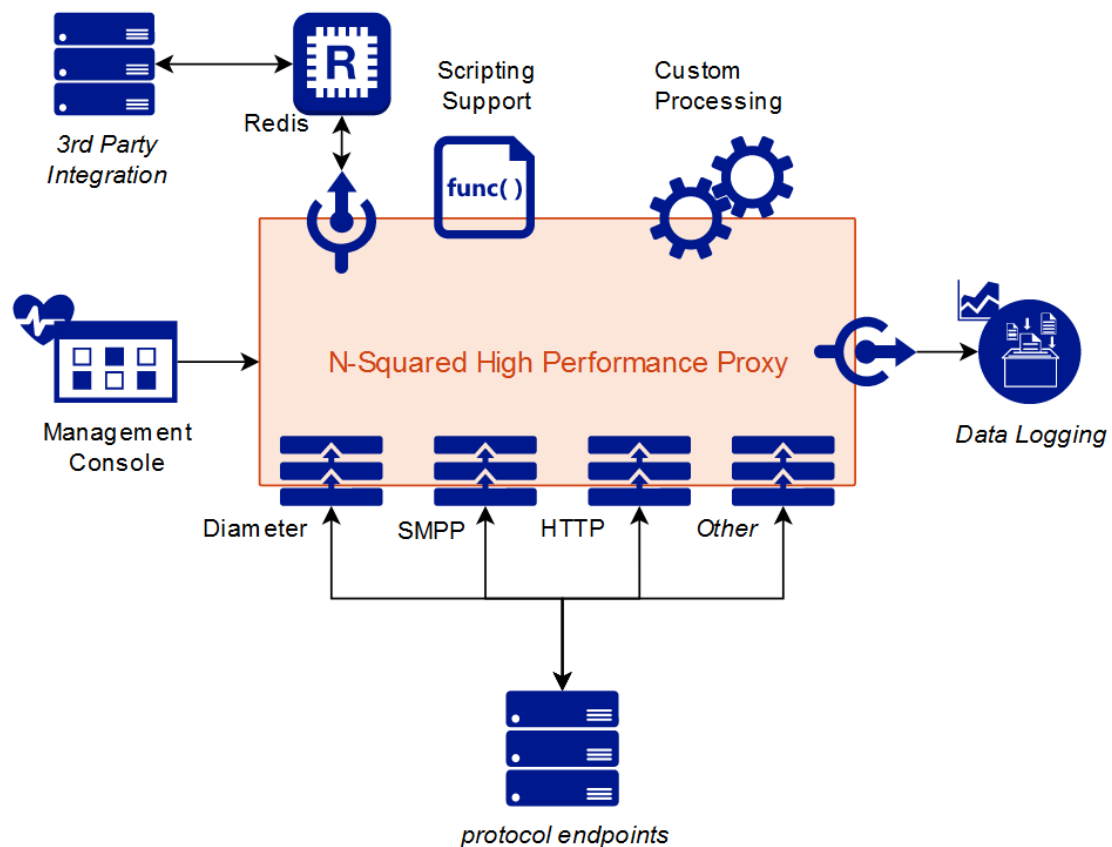


Figure 1 – N2HPP High Level Architecture

The N2HPP is JVM based software which can be deployed either in-premises and self-hosted, or cloud-based as a third-party virtualized solution. Each N2HPP node can be managed as an individual high-performance proxy, or multiple nodes may be clustered together for additional transaction management functionality such as shared Diameter session maps.

N-Squared High-Performance Proxy

Best deployed on Linux-based operating systems, the N2HPP is provided packaged for all modern Linux environments including RedHat 8 and 9, Oracle Enterprise Linux, Debian 18.04 or newer and its derivatives.

As a JVM based solution, the N2HPP targets OpenJDK, Amazon Corretto, and Sun's commercial JVM.

Protocols

The N2HPP is delivered with the N-Squared SMPP SMS gateway, a service supporting the intelligent proxy of SMPP messages between ASP and MC endpoints, MC to MC relay, and SMS notification submission by IT systems via JSON. Supporting a comprehensive range of text encodings, the N2HPP SMPP implementation handles secure SMPP connectivity, delivery receipts, and custom SMPP TLVs.

The N2HPP is delivered with the N-Squared Diameter proxy and relay agent for the management of Diameter traffic within LTE environments. Implemented against RFC3588, the N2HPP can load share inbound Diameter requests from multiple clients through to multiple servers.

The N2HPP is delivered with a web-services component for the proxy of HTTP based REST and SOAP requests. Connections may be configured with both server and client SSL certificates for point-to-point encrypted communication.

First-class Redis integration supporting message streaming through the Redis data-store enables additional use-cases, including the integration of 3rd party systems and scripts into the messaging pathway using Redis as a message bus and relay system.

Performance

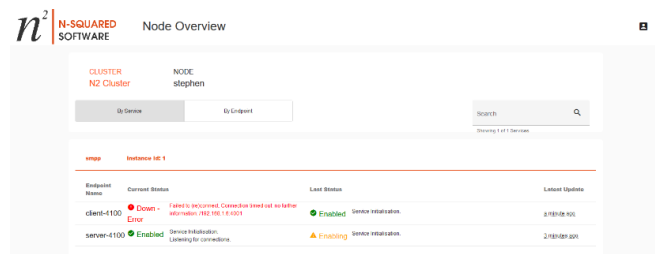
As a high-performance proxy, N2HPP is designed for efficient and fast message delivery. Built with a modern event-based message delivery model, each node is vertically scalable, using all server cores and CPU threads available to it. Horizontal scalability is trivially achieved with the N2HPP due no database being required for its function.

Milliseconds count, and the N2HPP is developed to keep the message transition time within the proxy's logic pathways minimal. Message encoding and decoding is minimized and features which lower performance can be disabled for faster raw message processing.

Operational Management

Designed to maximise system uptime, the N2HPP operational management console is available over secure communication channels (including HTTPS and SSH) on each cluster node. A published REST API allows other tools to directly manage the N2HPP.

A broad spectrum of cluster management capabilities, including support for the enabling, quiescing and re-configuration endpoints and nodes is available through the operational console.





Protocol endpoints may be configured to generate comprehensive text EDRs for proxied transactions for external data warehousing to disk or direct to other storage sinks.

Comprehensive counters are published by the N2HPP and may be aggregated and displayed through external third-party monitoring and statistics tools such as Prometheus or Graphite.

Extensibility and Customisation

The N2HPP is built on N-Squared’s composable JSLEE software stack and supports transaction and message manipulation through scripting. First-class support for Lua allows engineering teams to develop proxy extensions for complicated use-cases. For simpler scenarios, a comprehensive JSON-based translation engine supports message manipulation with no direct programming required.

With access to N-Squared’s engineering team, high performance custom requirements such as comprehensive Diameter routing extensions and external custom database-based routing solutions can be developed and maintained for individual deployments.