NetScaler xDS adapter

Contents

NetScaler xDS adapter: A way to intgrate NetScaler with Istio Service Mesh

A service mesh is an infrastructure layer that handles communication between microservices and provides capabilities like service discovery, load balancing, security, and monitoring. Istio is an open source and platform-independent service mesh that connects, monitors, and secures microservices.

NetScaler has advanced traffic management capabilities for enhancing application performance and provides comprehensive security. NetScaler integrations with Istio allow you to secure and optimize traffic for applications in the service mesh using NetScaler features.

The NetScaler xDS adapter is a container for integrating NetScaler with service mesh control plane implementations based on xDS APIs (Istio, Consul, and so on). It communicates with the service mesh control plane and listens for updates by acting as a gRPC client to the control plane API server. Based on the updates from the control plane, the NetScaler xDS-Adaptor generates the equivalent NetScaler configuration.

NetScaler can be integrated with Istio in the following ways:

- NetScaler CPX, MPX, or VPX as an Ingress Gateway to the service mesh.
- NetScaler CPX as a sidecar proxy with application containers in the service mesh.
- NetScaler CPX as an Egress Gateway for the service mesh.
- NetScaler VPX as an Egress Gateway

NetScaler as an Ingress Gateway for Istio

An Istio ingress gateway acts as an entry point for the incoming traffic and secures and controls access to the service mesh from outside. It also performs routing and load balancing. NetScaler CPX, MPX, or VPX can be deployed as an ingress gateway to the Istio service mesh.

NetScaler CPX as a sidecar proxy for Istio

In an Istio service mesh, a sidecar proxy runs alongside application pods and it intercepts and manage incoming and outgoing traffic for applications. NetScaler CPX can be deployed as the sidecar proxy in the application pods. A sidecar proxy applies the configured routing policies or rules to the ingress and egress traffic from the pod.

NetScaler as an Egress Gateway for Istio

An Egress Gateway defines the traffic exit point from a service mesh. The NetScaler as an Egress Gateway performs load balancing, monitoring at the edge of the service mesh. It also provides routing rules to exit the Istio service mesh.

NetScaler VPX as an Egress Gateway

An Egress Gateway defines the traffic exit point from a service mesh. NetScaler VPX can be deployed as an Egress Gateway to the Istio service mesh. In this deployment, a Kubernetes pod is deployed with a NetScaler xDS adapter container. The NetScaler xDS adapter container connects to the Istio control plane and reads the egress configuration and then configures the NetScaler VPX accordingly.

For information on NetScaler xDS adapter deployment architecture, see Deployment architecture.

Deployment architecture

December 31, 2023

The Istio service mesh can be logically divided into control plane and data plane components. The data plane is composed of a set of proxies which manage the network traffic between instances of the service mesh. The control plane generates and deploys the configuration that controls the data plane's behavior.

For detailed information on Istio architecture and different components, see Istio documentation.

NetScaler Integration with Istio control plane components

The Istio control plane is a set of gRPC based services and it pushes configuration changes to clients listening at the data plane. Pilot, Mixer, Galley, and Citadel are important control plane components. Out of these components, the data plane proxy primarily needs to interact with Pilot and Citadel.

Pilot is a gRPC based xDS server and provides configuration data to proxies. NetScaler provides an xDS client called `xDS-adapter` to communicate with the Istio control plane for installing NetScalers in Istio service mesh. It acts as a gRPC client to the control plane API server and listens to updates. Based on the updates from the control plane, NetScaler xDS adapter generates the equivalent NetScaler configuration. Then, it configures the NetScaler ingress or proxy device accordingly.

Citadel is a control plane service which provides key and certificate management. It is responsible for providing TLS certificates to data plane proxies. NetScaler xDS adapter monitors secrets managed by Citadel, and updates the NetScaler proxy with relevant details.

NetScaler service mesh solution provides a container, NetScaler Metrics Exporter, which collects the statistical data from NetScaler Ingress Gateway device and exports it to Prometheus.

Citrix also provides its own in-house solution NetScaler Observability Exporter for the telemetry purpose. NetScaler CPX running as a sidecar proxy interacts with the NetScaler Observability Exporter. NetScaler CPX sends metrics and transactions to NetScaler Observability Exporter. NetScaler Observability Exporter supports endpoints such as Zipkin and Prometheus, and sends the data collected from sidecar proxies to these endpoints in an appropriate format.

NetScaler can be integrated with Istio in three ways:

- NetScaler CPX, MPX, or VPX as an Ingress Gateway to the service mesh
- NetScaler CPX as a sidecar proxy with application containers in the service mesh
- NetScaler CPX as an Egress Gateway for the service mesh

All the modes can be combined to have a unified data plane solution.
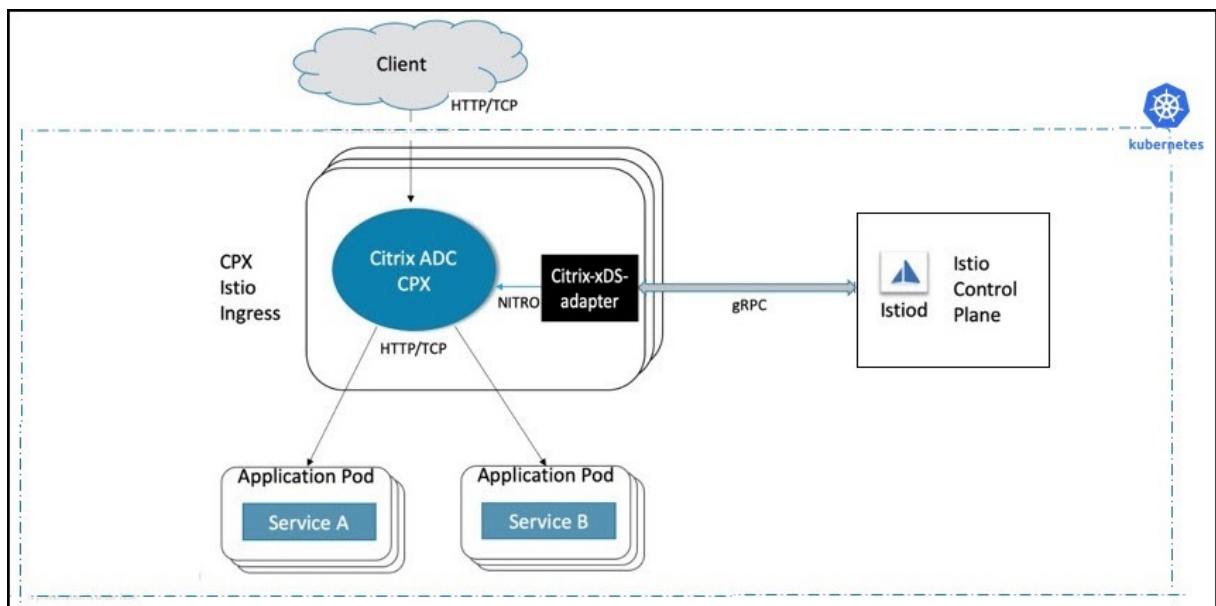
Deploy NetScaler as an Ingress Gateway

An Istio Ingress Gateway acts as an entry point for the incoming traffic to the service mesh. It secures and controls access to the service mesh from outside. You can deploy a NetScaler CPX, MPX, or VPX as an ingress Gateway to the Istio service mesh.

NetScaler CPX as an Ingress Gateway

The NetScaler CPX Ingress Gateway is deployed as a set of horizontal scaling Kubernetes pods. Each pod runs a NetScaler CPX that controls and routes the incoming requests.
Each pod also runs an NetScaler xDS adapter container as a sidecar to the NetScaler. The NetScaler xDS adapter container establishes a connection with Istio control plane components, reads the ingress policies applied, and configures the NetScaler CPX accordingly.

The following diagram shows a sample deployment of NetScaler CPX as an Ingress Gateway.

For detailed instructions on how to deploy NetScaler CPX as an Ingress Gateway, see Deploying NetScaler with Istio.

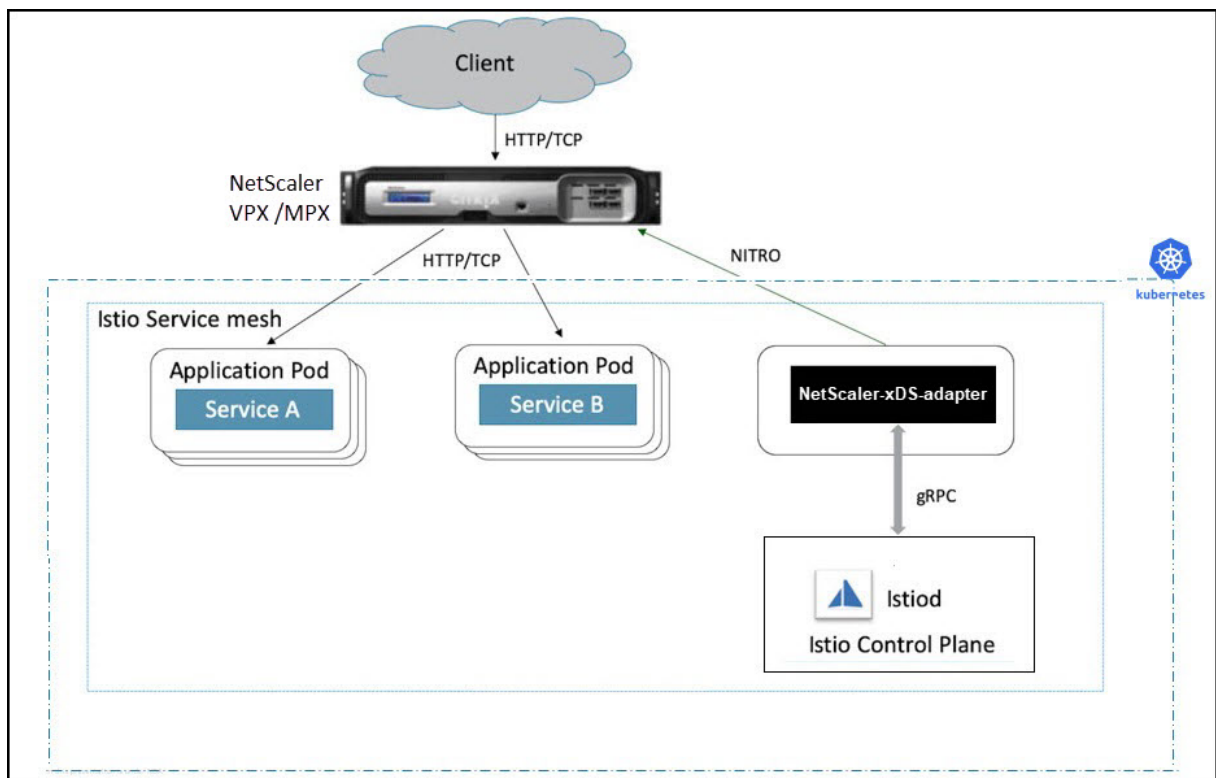**NetScaler MPX or VPX as an Ingress Gateway**

NetScaler VPX or MPX can be deployed as an Ingress Gateway to the Istio service mesh. In this deployment, a Kubernetes pod is deployed with an NetScaler xDS adapter container. The NetScaler xDS adapter container connects to the Istio control plane and reads the ingress configuration and then configures the NetScaler VPX or MPX accordingly.

> **Note:**
>
> For this deployment, establish the connectivity between the concerned NetScaler and the cluster nodes.

The following diagram shows a sample deployment of NetScaler VPX/MPX as an Ingress Gateway.

For detailed instructions on how to deploy NetScaler VPX or MPX as an Ingress Gateway, see Deploying NetScaler with Istio.
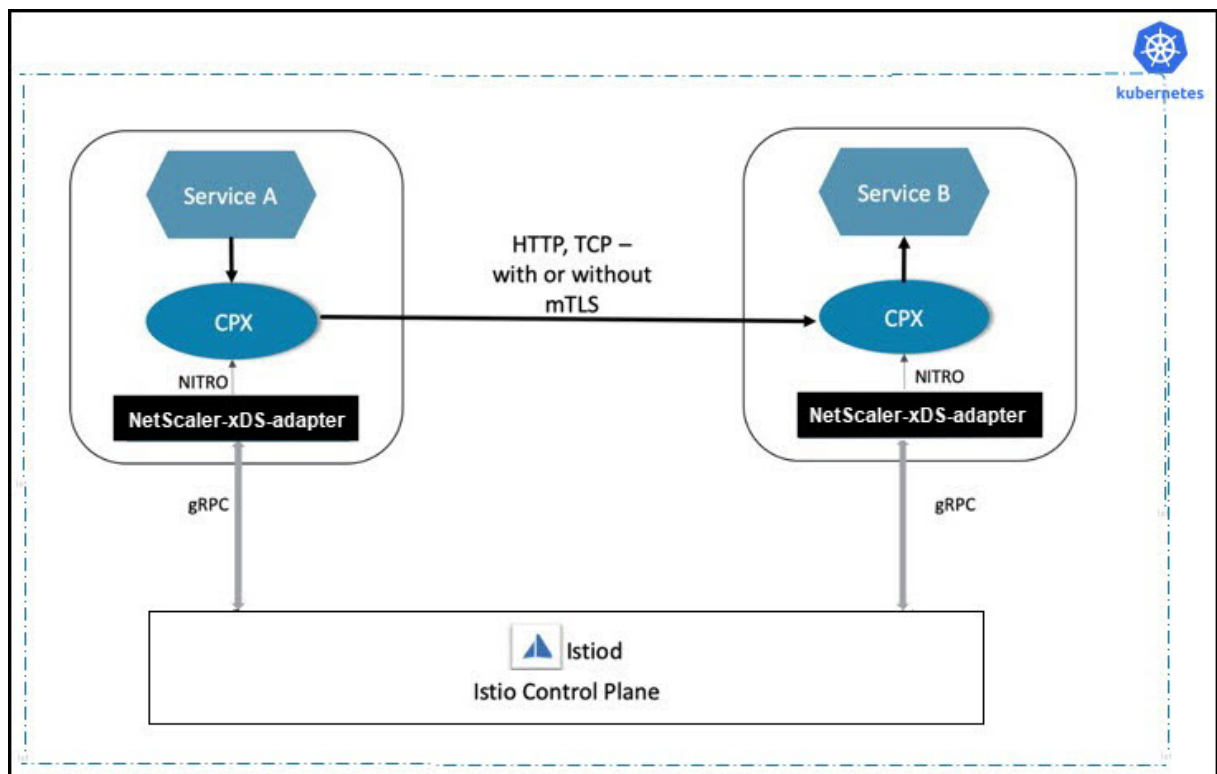
Deploy NetScaler CPXs as sidecars

NetScaler CPX can be deployed as a sidecar proxy in application pods. It intercepts all the incoming and outgoing traffic from the application pod and applies the configured routing policies or rules.

In this deployment, each application pod contains a NetScaler CPX and an NetScaler xDS adapter container along with the application container.

The NetScaler xDS adapter container listens to updates from the Istio control plane and configures the NetScaler CPX instance accordingly.

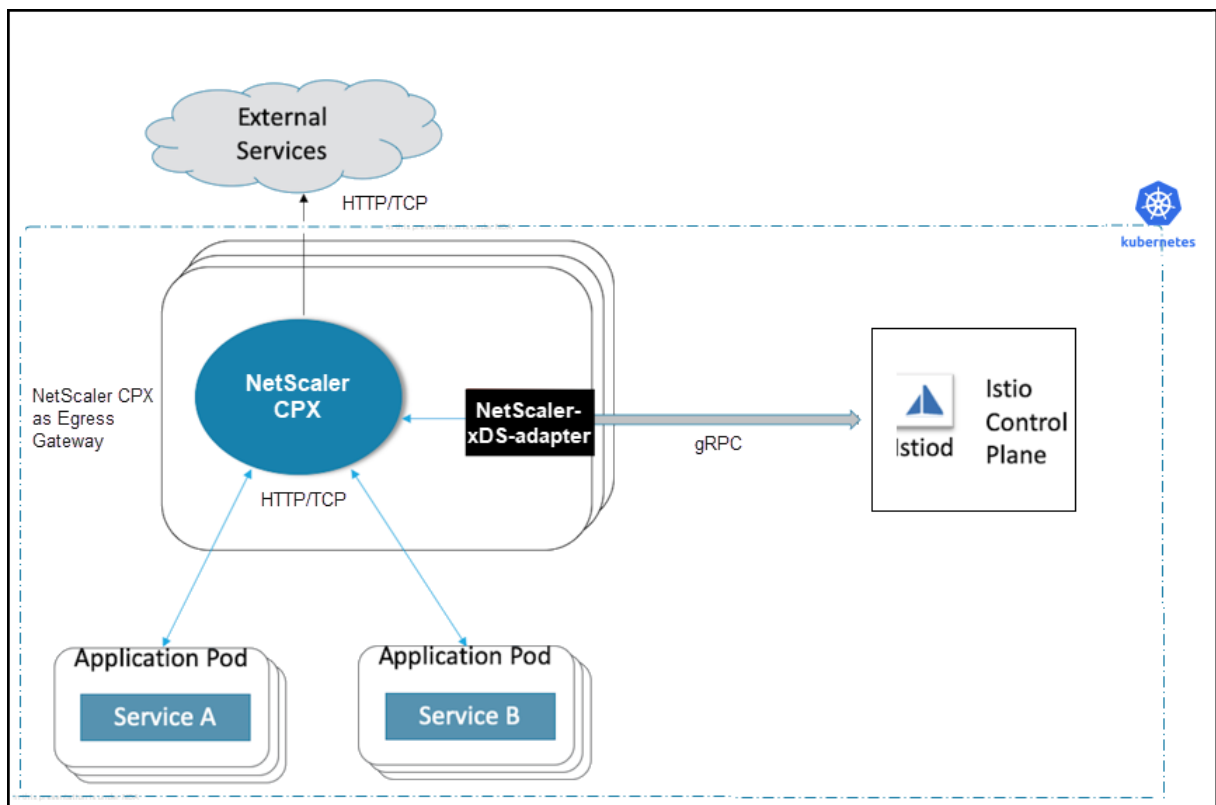The following diagram shows a sample deployment of NetScaler CPXs as sidecars.

For detailed instructions on how to deploy NetScaler CPX as a sidecar, see Deploying NetScaler with Istio.

Deploy NetScaler CPX as an Egress Gateway

An Egress Gateway defines the traffic exit point from a service mesh. NetScaler CPX as an Egress Gateway performs load balancing, monitoring at the edge of the service mesh, and provides routing rules to exit the service mesh.

The following diagram shows a sample deployment of NetScaler CPX as an Egress Gateway.

For detailed instructions on how to deploy NetScaler CPX as an Egress Gateway, see Deploying NetScaler with Istio.
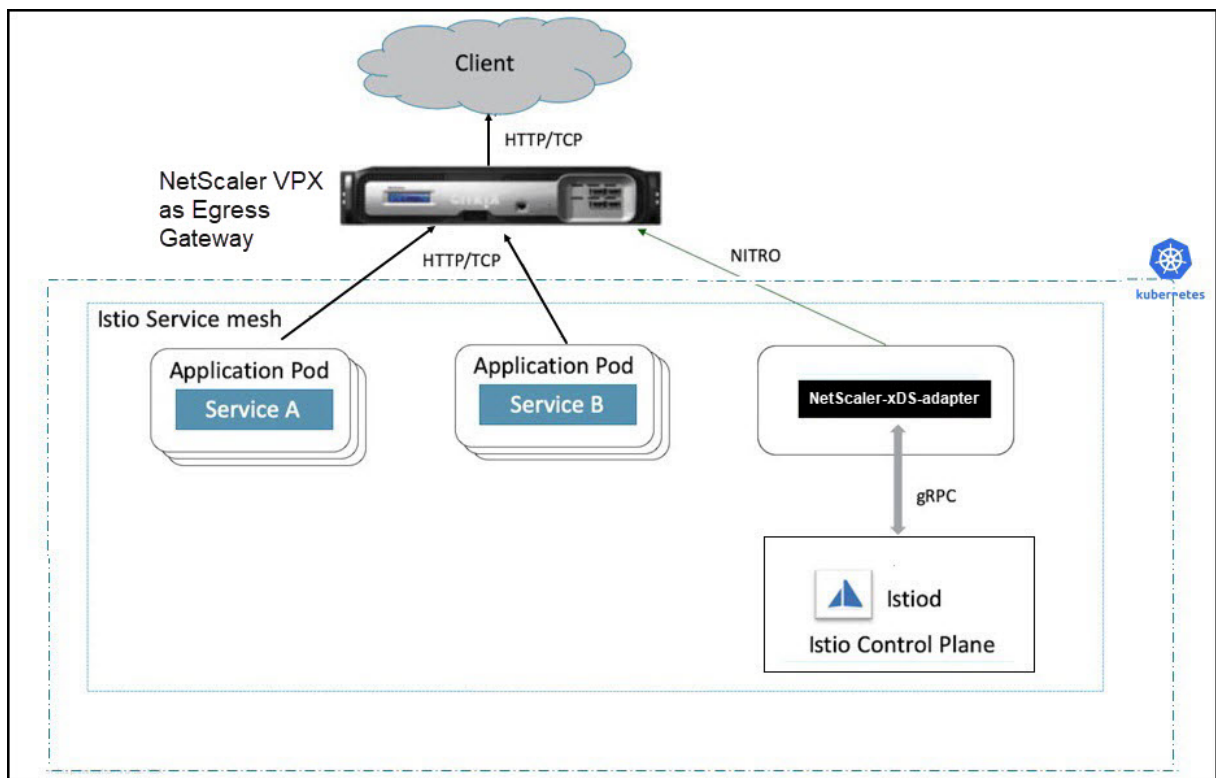
Deploy NetScaler VPX as an Egress Gateway

An Egress Gateway defines the traffic exit point from a service mesh. NetScaler VPX can be deployed as an Egress Gateway to the Istio service mesh. In this deployment, a Kubernetes pod is deployed with an NetScaler xDS adapter container. The NetScaler xDS adapter container connects to the Istio control plane and reads the egress configuration and then configures the NetScaler VPX accordingly.

> **Note:**
>
> For this deployment, establish the connectivity between the concerned NetScaler and the cluster nodes.

The following diagram shows a sample deployment of NetScaler VPX as an Egress Gateway.

For detailed instructions on how to deploy NetScaler VPX as an Egress Gateway, see Deploying NetScaler with Istio.

Helm charts for NetScaler integration with Istio

December 31, 2023

The citrix-helm-charts repository contains Helm charts for installing NetScaler CPX as Ingress Gateway, Egress Gateway, and sidecar proxy in Istio version 1.6.4.

> **Note:**
>
> Helm charts may require access to the `kube-system` namespace and require cluster wide permissions for full functionality. Install and configure the Helm client and Tiller.

Helm installation

For more information, see the Helm Installation Guide.

Stable charts

The stable directory contains Helm charts which are created and tested by Citrix.

Charts

`citrix-adc-istio-ingress-gateway`: Use this chart to deploy NetScaler as an Ingress Gateway in an Istio environment.

`citrix-cpx-istio-sidecar-injector`: Use this chart to deploy resources responsible for injecting NetScaler CPX as a sidecar in Istio Service Mesh.

`citrix-adc-istio-egress-gateway`: Use this chart to deploy NetScaler as an Egress Gateway in an Istio environment.

Documentation

The Helm chart README describes the functionality and the `values.yaml` file shows the default values.

NetScaler CPX licensing

December 31, 2023

NetScaler CPX supports pool licensing. NetScaler ADM can act as your license server to license your NetScaler CPX instances. NetScaler ADM is available both on-premises and a cloud service as well.

For licensing NetScaler CPX, you need to provide required information in the YAML file. This information is required for automatically picking the licensing information. For more information about NetScaler CPX licensing, see NetScaler CPX Licensing.

NetScaler xDS adapter Developer Guide

December 31, 2023

Build the NetScaler xDS adapter

To build the NetScaler xDS adapter container, you need to have the following software installed on your machine:

- Docker
- Make
- Go 1.13 version

To build images, run the following command:

```
1  make build
```

To create the NetScaler xDS adapter container, run the following command:

```
1  make docker_build
```

Testing the NetScaler xDS adapter

NetScaler xDS adapter is developed to work generically for Ingress and sidecar proxy. So, testing NetScaler xDS adapter in any mode of NetScaler CPX is enough. NetScaler xDS adapter's test coverage primarily focuses on Unit testing of NetScaler xDS adapter code and Integration testing with NetScaler.

As a prerequisite for testing NetScaler xDS adapter, run NetScaler CPX in the same machine.

Specify the following environment variables before running the test command.

Parameter	Description
NS_TEST_IP	NetScaler management IP
NS_TEST_NITRO_PORT	NetScaler REST API port
NS_TEST_LOGIN	NetScaler user name
NS_TEST_PASSWORD	NetScaler password

Tests with code coverage are invoked with `make utest`. This triggers both unit and integration tests.

```
1      make utest
```

You can clean up using the following command:

```
1      make clean
```