Open discussion on Test-Infra

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Agenda

• Project overview
  • Miscellaneous folders
  • e2e folder
    • Pre-bake VM image
    • Cloud CI management
    • Sandbox provision

• Areas for improvement
  • Extract Ansible Roles
  • Implement KUTTL Framework
  • Use Doc Detective tool
  • Replace MetalLB for KinD cloud provider
  • Use Ephemeral Docker image registry
Project overview
Test Infrastructure provide tools and scripts to guarantee the proper functionality of Nephio Components

- Provides scripts to install requirements used by the Test Cases (ansible bootstrap role).
- Installs Nephio components (ansible install role).
- Contains a kpt Ansible module.
- Provisions a local/remote Nephio Sandbox through a Vagrantfile.
- Provides Terraform scripts utilized by CI.
- Stores Dockerfiles for CI artifacts.
- Contains bash scripts used during the execution of the End-To-End testing.

https://github.com/nephio-project/test-infra/
Miscellaneous folders

- .github
  - Add GitHub Issue and PR templates...
- assets
  - Add files via upload
- e2e
  - Fixing token path (#256)
- images
  - Update gotests to Go 1.22 (#258)
- prow
  - Add Fedora 34 OAI Periodic to config
- tools
  - Dependabot config generator (#252)
  - .gitattributes
    - Create repository settings (#107)
  - .gitignore
    - Enable Molecule tests in PROW (#110)
    - add support for OAI e2e tests for feeds
- LICENSE
  - Initial commit
- Makefile
  - Enable Vagrant support (#29)
- OWNERS
  - Update OWNERS file (#178)
- README.md
  - Update README.md

- GitHub PR templates (eventually GitHub actions)
- Images used by the Wiki
- Docker image definitions for CI artifacts
- Prow configuration
- Python scripts for dependabot and release GitHub actions
Call for action:
- Expose “nephio-pre-baked-*” images for consumption
- Implement cleanup procedure to avoid cloud costs
e2e folder – Cloud CI mgmt.

CI Workflow overview

Flow:
- prow
- Terraform
- Google Cloud
- init.sh
- install_sandbox.sh
- e2e.sh
- ANSIBLE
### e2e folder – Sandbox provision (1/3)

```bash
if [ -d "$REPO_DIR" ]; then
  runuser -u "$NPEPHIO_USER" git clone "$REPO" "$REPO_DIR"
  if [ "$BRANCH" = "main" ]; then
    pushd "$REPO_DIR" >>/dev/null
    TAG=$(runuser -u "$NPEPHIO_USER" -- git tag --list)
    if [ "$TAG" = "$BRANCH" ]; then
      runuser -u "$NPEPHIO_USER" -- git checkout --detached
    else
      runuser -u "$NPEPHIO_USER" -- git checkout $TAG
      popd >>/dev/null
    fi
  else
    ansible_cmd="$(command -v ansible-playbook) -i 127.0.0.1, playbooks/cluster.yml"
    if [ -n "$ANSIBLE_CMD_EXTRA_VAR_LIST:" ]; then
      ansible_cmd="--extra-vars="$(ANSIBLE_CMD_EXTRA_VAR_LIST)"
    fi
    fi
  fi
fi
find "$REPO_DIR" -name "*.sh" -exec sh -- {} +
if cp "$REPO_DIR/e2e/provision/*" "$NPEPHIO_USER:$NPEPHIO_DIR"
chown "$NPEPHIO_USER:$NPEPHIO_DIR"

# Sandbox Creation
int_start=$(date +%s)
cd "$REPO_DIR/e2e/provision"
export DEBUG DOCKERHUB_USERNAME DOCKERHUB_TOKEN FAIL_FAST
runuser -u "$NPEPHIO_USER" ./install_sandbox.sh
printf "%s secs
$((($(date +%s) - int_start)))"
```

https://github.com/nephio-project/test-infra/blob/main/e2e/provision/install_sandbox.sh
Provides two main Ansible roles:

1. **bootstrap** – Validate host requirements, loads kernel modules, creates a KinD management cluster, installs gitea, resource-backend, cluster-api, cert-manager and metalLB packages in parallel.
2. **install** – Provides a local or remote installation of the Nephio components in parallel.
CI Workflow overview

Diagram showing the workflow from prow to Terraform, then to Google Cloud, and finally to Ansible with the commands init.sh, install_sandbox.sh, and e2e.sh.
e2e folder – Sandbox provision (3/3)

Test cases resources

https://github.com/nephio-project/test-infra/blob/main/e2e/e2e.sh
Areas for improvement
Provide Nephio management checkpoints for faster startups

https://criu.org

$ docker checkpoint create kind-nephio 20240105

https://packages.ubuntu.com/jammy/criu
https://packages.fedoraproject.org/pkgs/criu/criu/

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoid cold starts</td>
<td>Experimental feature</td>
</tr>
<tr>
<td>Ubuntu 22.04+ and Fedora38+ packages</td>
<td></td>
</tr>
<tr>
<td>Reutilization of code</td>
<td></td>
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The following Ansible role needs their own repository:

- https://github.com/nephio-project/test-infra/tree/main/e2e/provision/playbooks/roles/bootstrap
- https://github.com/nephio-project/test-infra/tree/main/e2e/provision/playbooks/roles/install
- https://github.com/nephio-project/test-infra/tree/main/e2e/provision/playbooks/roles/kpt
- https://github.com/nephio-project/test-infra/tree/main/e2e/provision/playbooks/roles/upgrade

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<tr>
<td>Major visibility</td>
<td>kpt Ansible module dependency</td>
</tr>
<tr>
<td>Faster development cycles</td>
<td>Complex troubleshooting</td>
</tr>
<tr>
<td>Reutilization of code</td>
<td></td>
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</tbody>
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Implement KUTTL Framework (1/2)

Replace the bash scripts for the KUbernetes Test TooL (https://kuttl.dev/) framework for validation of Test Cases (Free5Gc & OAI)

- https://github.com/nephio-project/test-infra/tree/main/e2e/tests/free5gc
- https://github.com/nephio-project/test-infra/tree/main/e2e/tests/oai

<table>
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<tr>
<td>KRM testing approach</td>
<td>Learning curve</td>
</tr>
<tr>
<td>Easy to declare the expected state</td>
<td>KREW plugin requirement</td>
</tr>
<tr>
<td>Reduce instructions and complexity</td>
<td><a href="https://github.com/nephio-project/nephio/issues/593">https://github.com/nephio-project/nephio/issues/593</a></td>
</tr>
</tbody>
</table>
Implement KUTTL Framework (2/2)

```
apiVersion: kuttl.dev/v1beta1
description: TestSuite
name: e2e
testDirs:
  - tests/
timeout: 600
parallel: 1
namespace: default
commands:
  - command: kubectl apply -f https://raw.githubusercontent.com/electrocucaracha/nephio-pocs/7a26a9e7d4e4049921c7ae5b9aee9175f17c7d
```

https://github.com/electrocucaracha/nephio-pocs/commit/7a26a9e7d4e4049921c7ae5b9aee9175f17c7d
Use Doc detective tool

Docs as Tests ([https://www.docsastests.com/](https://www.docsastests.com/)) seems to offer a new approach to keep documentation synchronized with the changes on the project. The Doc Detective ([https://doc-detective.com/](https://doc-detective.com/)) tool may provide a simple and easy solution to be implemented.

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<tr>
<td>Easy way to keep docs and tests in sync</td>
<td>Learning curve</td>
</tr>
<tr>
<td>Non-intrusive tool</td>
<td>Requires further investigation (requirements and License)</td>
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Kubernetes Cloud Provider for KIND (https://sigs.k8s.io/cloud-provider-kind) mimics the functionality offered by CSPs. This project could benefit the Nephio Sandbox.

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<td>Reduces components on the Nephio management cluster</td>
<td>Early stages of the tool</td>
</tr>
<tr>
<td>Simulates a more realistic scenario</td>
<td>Dynamic IP allocation configured on Docker default_address_pools</td>
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https://github.com/electrocucaracha/nephio-pocs/commit/7643a4faaeb1c7b0db77440e7f4519fe9115e320
We can use a Ephemeral Docker image registry in the CI ([http://ttl.sh/](http://ttl.sh/)) to replicate CI environments locally.

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<td>Sharing temporal Docker images</td>
<td>External service (increase network traffic or delays)</td>
</tr>
<tr>
<td>Delegates the responsibility to manage temporal build images</td>
<td>Additional dependencies</td>
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More ideas?