Study Plan — NGINX Cookbook, 3rd Edition

User Story Template & Story Card Definition

October 22, 2025

Contents

1 How to Use This Template

1. Start with the **one-sentence story** (persona, goal, value).
2. Add **acceptance criteria** in Gherkin (Given/When/Then).
3. Capture **non-functional requirements** (performance, security, accessibility, ...).
4. Confirm **Definition of Ready** (DoR) before sprint; confirm **Definition of Done** (DoD) before acceptance.
5. Keep stories **INVEST**: Independent, Negotiable, Valuable, Estimable, Small, Testable.

2 Study Plan — Story Cards by Chapter

NG-1 — Getting Started

Epic / Feature	Foundations
Business Value	Establish a clean base install and config layout to reduce future integration risk.
Priority / Estimate	Priority: Must · SP: 3
Persona	Platform engineer
Dependencies	Package repo access; VM/container; sudo
Assumptions / Risks	Port conflicts or SELinux/AppArmor blocks

Story *As a Platform engineer, I want to Getting Started so that Establish a clean base install and config layout to reduce future integration risk..*

Non-Functional Performance · Security · Reliability · Accessibility · Privacy · i18n

Acceptance Criteria (BDD)

Scenario Happy path

Given the target repositories, environments, and context are available

When the Hands-on Objectives for this chapter are executed

Then the stated Outcomes/Deliverables for this chapter are produced, reviewed, and published

Definition of Ready: Persona clear; AC drafted; Dependencies known; Estimate set. • **Definition of Done:** All ACs pass; Tests green; Security/a11y checks; Docs updated; Deployed/flagged.

Tasks

- ☐ Provision a VM/container and open port 80.
- ☐ Install NGINX; enable via systemd.
- ☐ Create a minimal site; modularize with `include`.
- ☐ Add access/error logs with rotation.
- ☐ Validate with `nginx -t` and `curl -I`; commit baseline configs and README.

NG-2 — High Performance Load Balancing

Epic / Feature	Traffic Distribution
Business Value	Improve latency and resiliency by balancing across multiple backends with health checks.
Priority / Estimate	Priority: Must · SP: 5
Persona	Traffic engineer
Dependencies	Two backends; load generator; ability to stop a node
Assumptions / Risks	Stateful apps may require stickiness; uneven load under spikes

Story *As a Traffic engineer, I want to High Performance Load Balancing so that Improve latency and resiliency by balancing across multiple backends with health checks..*

Non-Functional Performance · Security · Reliability · Accessibility · Privacy · i18n

Acceptance Criteria (BDD)

Scenario Happy path

Given the target repositories, environments, and context are available

When the Hands-on Objectives for this chapter are executed

Then the stated Outcomes/Deliverables for this chapter are produced, reviewed, and published

Definition of Ready: Persona clear; AC drafted; Dependencies known; Estimate set. • **Definition of Done:** All ACs pass; Tests green; Security/a11y checks; Docs updated; Deployed/flagged.

Tasks

- ☐ Define an `upstream` with two services; expose via a `server` block.
- ☐ Enable passive checks and tune timeouts; optionally enable slow start.
- ☐ Benchmark policies (round robin, least conn, IP hash) with `wrk`.
- ☐ Simulate node failure and verify failover and recovery.
- ☐ Commit configs and a short decision record.

NG-3 — Traffic Management and Shaping

Epic / Feature	Smart Routing
Business Value	Protect service quality and enable safe releases with canaries and rate limits.
Priority / Estimate	Priority: Must · SP: 5
Persona	Release engineer
Dependencies	Header/cookie routing; GeoIP DB if used
Assumptions / Risks	Aggressive limits can block legitimate users; canary must be measurable

Story *As a Release engineer, I want to Traffic Management and Shaping so that Protect service quality and enable safe releases with canaries and rate limits..*

Non-Functional Performance · Security · Reliability · Accessibility · Privacy · i18n

Acceptance Criteria (BDD)

Scenario Happy path

Given the target repositories, environments, and context are available

When the Hands-on Objectives for this chapter are executed

Then the stated Outcomes/Deliverables for this chapter are produced, reviewed, and published

Definition of Ready: Persona clear; AC drafted; Dependencies known; Estimate set. • **Definition of Done:** All ACs pass; Tests green; Security/a11y checks; Docs updated; Deployed/flagged.

Tasks

- ☐ Implement header/cookie based split routing to a canary upstream.
- ☐ Configure `limit_conn` and `limit_req` with a shared zone.
- ☐ Add `real_ip` to preserve client IP through proxies.
- ☐ Document playbook for throttling and unthrottling.

NG-4 — Massively Scalable Content Caching

Epic / Feature	Edge Caching
Business Value	Reduce latency and backend load by serving cached content with safe staleness.
Priority / Estimate	Priority: Must · SP: 5
Persona	Edge engineer
Dependencies	Writable cache path; disk space; cache key design
Assumptions / Risks	Improper keys can leak personalized data; bypass rules required for authenticated users

Story *As a Edge engineer, I want to Massively Scalable Content Caching so that Reduce latency and backend load by serving cached content with safe staleness..*

Non-Functional Performance · Security · Reliability · Accessibility · Privacy · i18n

Acceptance Criteria (BDD)

Scenario Happy path

Given the target repositories, environments, and context are available

When the Hands-on Objectives for this chapter are executed

Then the stated Outcomes/Deliverables for this chapter are produced, reviewed, and published

Definition of Ready: Persona clear; AC drafted; Dependencies known; Estimate set. • **Definition of Done:** All ACs pass; Tests green; Security/a11y checks; Docs updated; Deployed/flagged.

Tasks

- ☐ Define cache zone and keys; enable `proxy_cache_lock`.
- ☐ Add `proxy_cache_use_stale` for safe error codes.
- ☐ Implement bypass for authenticated users; purge admin endpoints if available.
- ☐ Log cache status and add a Grafana panel.

NG-5 — Programmability and Automation

Epic / Feature	Automation
Business Value	Lower toil and errors with declarative rollouts and simple scripting.
Priority / Estimate	Priority: Should · SP: 3
Persona	Platform engineer
Dependencies	Config templates; VCS; CI runner
Assumptions / Risks	Templating mistakes can break routes; require `nginx -t` gates

Story *As a Platform engineer, I want to Programmability and Automation so that Lower toil and errors with declarative rollouts and simple scripting..*

Non-Functional Performance · Security · Reliability · Accessibility · Privacy · i18n

Acceptance Criteria (BDD)

Scenario Happy path

Given the target repositories, environments, and context are available

When the Hands-on Objectives for this chapter are executed

Then the stated Outcomes/Deliverables for this chapter are produced, reviewed, and published

Definition of Ready: Persona clear; AC drafted; Dependencies known; Estimate set. • **Definition of Done:** All ACs pass; Tests green; Security/a11y checks; Docs updated; Deployed/flagged.

Tasks

- ☐ Create config templates with variables for upstreams and routes.
- ☐ Write an Ansible playbook to upload and reload on change.
- ☐ Add CI job that runs `nginx -t` before deploy.
- ☐ Add rollback procedure to the runbook.

NG-6 — Authentication and Authorization

Epic / Feature	Perimeter Security
Business Value	Protect sensitive endpoints and enable single sign-on.
Priority / Estimate	Priority: Must · SP: 5
Persona	Security engineer
Dependencies	Auth service/IdP; test JWTs
Assumptions / Risks	Clock skew breaks signatures; misconfigured bypass routes leak data

Story *As a Security engineer, I want to Authentication and Authorization so that Protect sensitive endpoints and enable single sign-on..*

Non-Functional Performance · Security · Reliability · Accessibility · Privacy · i18n

Acceptance Criteria (BDD)

Scenario Happy path

Given the target repositories, environments, and context are available

When the Hands-on Objectives for this chapter are executed

Then the stated Outcomes/Deliverables for this chapter are produced, reviewed, and published

Definition of Ready: Persona clear; AC drafted; Dependencies known; Estimate set. • **Definition of Done:** All ACs pass; Tests green; Security/a11y checks; Docs updated; Deployed/flagged.

Tasks

- ☐ Protect `/admin` with `auth_request`.
- ☐ Validate JWTs on `/api` (alg, iss, aud).
- ☐ Add clock skew tolerance and JWKS rotation if applicable.
- ☐ Document error mappings and login flow.

NG-7 — Security Controls and TLS

Epic / Feature	Defense in Depth
Business Value	Reduce attack surface and enforce transport security end to end.
Priority / Estimate	Priority: Must · SP: 5
Persona	Security engineer
Dependencies	Certificates, CA chain, WAF trial if used
Assumptions / Risks	HSTS pins HTTPS and must be planned; false positives in WAF policies

Story *As a Security engineer, I want to Security Controls and TLS so that Reduce attack surface and enforce transport security end to end..*

Non-Functional Performance · Security · Reliability · Accessibility · Privacy · i18n

Acceptance Criteria (BDD)

Scenario Happy path

Given the target repositories, environments, and context are available

When the Hands-on Objectives for this chapter are executed

Then the stated Outcomes/Deliverables for this chapter are produced, reviewed, and published

Definition of Ready: Persona clear; AC drafted; Dependencies known; Estimate set. • **Definition of Done:** All ACs pass; Tests green; Security/a11y checks; Docs updated; Deployed/flagged.

Tasks

- ☐ Configure TLS (modern ciphers and ALPN).
- ☐ Redirect HTTP to HTTPS; enable HSTS with safe max-age.
- ☐ Implement CORS allowlist for specific origins/methods.
- ☐ Optionally enable a WAF and tune one policy.

NG-8 — HTTP/2, HTTP/3, and gRPC

Epic / Feature	Modern Protocols
Business Value	Improve performance and compatibility with multiplexed protocols and streaming RPC.
Priority / Estimate	Priority: Should · SP: 3
Persona	Platform engineer
Dependencies	Browser or curl with HTTP/3 support; demo gRPC server
Assumptions / Risks	Middleboxes may block UDP for HTTP/3; ensure fallbacks

Story *As a Platform engineer, I want to HTTP/2, HTTP/3, and gRPC so that Improve performance and compatibility with multiplexed protocols and streaming RPC..*

Non-Functional Performance · Security · Reliability · Accessibility · Privacy · i18n

Acceptance Criteria (BDD)

Scenario Happy path

Given the target repositories, environments, and context are available

When the Hands-on Objectives for this chapter are executed

Then the stated Outcomes/Deliverables for this chapter are produced, reviewed, and published

Definition of Ready: Persona clear; AC drafted; Dependencies known; Estimate set. • **Definition of Done:** All ACs pass; Tests green; Security/a11y checks; Docs updated; Deployed/flagged.

Tasks

- ☐ Enable HTTP/2 on TLS listeners; verify ALPN.
- ☐ Enable HTTP/3 with QUIC and confirm UDP reachability.
- ☐ Proxy a demo gRPC service and verify with a client.

NG-9 — Media and File Streaming

Epic / Feature	Content Delivery
Business Value	Support large media delivery with seeking and bandwidth control.
Priority / Estimate	Priority: Could · SP: 3
Persona	Media delivery engineer
Dependencies	MP4 asset; test player
Assumptions / Risks	Incorrect range settings cause buffering; respect licensing

Story *As a Media delivery engineer, I want to Media and File Streaming so that Support large media delivery with seeking and bandwidth control..*

Non-Functional Performance · Security · Reliability · Accessibility · Privacy · i18n

Acceptance Criteria (BDD)

Scenario Happy path

Given the target repositories, environments, and context are available

When the Hands-on Objectives for this chapter are executed

Then the stated Outcomes/Deliverables for this chapter are produced, reviewed, and published

Definition of Ready: Persona clear; AC drafted; Dependencies known; Estimate set. • **Definition of Done:** All ACs pass; Tests green; Security/a11y checks; Docs updated; Deployed/flagged.

Tasks

- ☐ Host an MP4 and validate range requests.
- ☐ Generate a simple HLS variant and serve from NGINX.
- ☐ Apply per-location bandwidth limits for test users.

NG-10 — Cloud Deployments

Epic / Feature	Cloud Ops
Business Value	Provision repeatable, hardened NGINX in cloud and integrate with platform services.
Priority / Estimate	Priority: Should · SP: 5
Persona	Cloud engineer
Dependencies	Cloud creds; Terraform; remote state
Assumptions / Risks	Ingress/egress must permit health checks; image hardening required

Story *As a Cloud engineer, I want to Cloud Deployments so that Provision repeatable, hardened NGINX in cloud and integrate with platform services..*

Non-Functional Performance · Security · Reliability · Accessibility · Privacy · i18n

Acceptance Criteria (BDD)

Scenario Happy path

Given the target repositories, environments, and context are available

When the Hands-on Objectives for this chapter are executed

Then the stated Outcomes/Deliverables for this chapter are produced, reviewed, and published

Definition of Ready: Persona clear; AC drafted; Dependencies known; Estimate set. • **Definition of Done:** All ACs pass; Tests green; Security/a11y checks; Docs updated; Deployed/flagged.

Tasks

- ☐ Create a hardened image with NGINX and baseline configs.
- ☐ Write Terraform for networking, load balancer, and autoscaling.
- ☐ Use user-data to render configs and run `nginx -t` before start.
- ☐ Run a smoke test and record outputs.

NG-11 — Containers and Microservices

Epic / Feature	Service Gateway
Business Value	Provide consistent ingress and routing in container platforms.
Priority / Estimate	Priority: Must · SP: 5
Persona	SRE
Dependencies	Docker or Kubernetes cluster; manifests
Assumptions / Risks	Mis-specified probes cause restarts; config drift between images

Story *As a SRE, I want to Containers and Microservices so that Provide consistent ingress and routing in container platforms..*

Non-Functional Performance · Security · Reliability · Accessibility · Privacy · i18n

Acceptance Criteria (BDD)

Scenario Happy path

Given the target repositories, environments, and context are available

When the Hands-on Objectives for this chapter are executed

Then the stated Outcomes/Deliverables for this chapter are produced, reviewed, and published

Definition of Ready: Persona clear; AC drafted; Dependencies known; Estimate set. • **Definition of Done:** All ACs pass; Tests green; Security/a11y checks; Docs updated; Deployed/flagged.

Tasks

- ☐ Build a minimal NGINX image with mounted configs.
- ☐ Compose a local API gateway to three services.
- ☐ Deploy a Kubernetes ingress and verify routes and probes.

NG-12 — High Availability and State Sync

Epic / Feature	Resilience
Business Value	Keep service available through node failures and maintenance.
Priority / Estimate	Priority: Must · SP: 5
Persona	SRE
Dependencies	Two nodes; shared/synchronized state if required
Assumptions / Risks	Split brain risk if failover is not coordinated

Story *As a SRE, I want to High Availability and State Sync so that Keep service available through node failures and maintenance..*

Non-Functional Performance · Security · Reliability · Accessibility · Privacy · i18n

Acceptance Criteria (BDD)

Scenario Happy path

Given the target repositories, environments, and context are available

When the Hands-on Objectives for this chapter are executed

Then the stated Outcomes/Deliverables for this chapter are produced, reviewed, and published

Definition of Ready: Persona clear; AC drafted; Dependencies known; Estimate set. • **Definition of Done:** All ACs pass; Tests green; Security/a11y checks; Docs updated; Deployed/flagged.

Tasks

- ☐ Configure a two-node pair with a virtual IP or external LB.
- ☐ Sync required state or use stateless routing.
- ☐ Run a failover exercise and record timings.

NG-13 — Monitoring and Telemetry

Epic / Feature	Observability
Business Value	Shorten MTTR with focused metrics and dashboards.
Priority / Estimate	Priority: Must · SP: 3
Persona	Observability engineer
Dependencies	Prometheus + Grafana; access to logs
Assumptions / Risks	Excessive logging impacts performance; buffer appropriately

Story *As a Observability engineer, I want to Monitoring and Telemetry so that Shorten MTTR with focused metrics and dashboards..*

Non-Functional Performance · Security · Reliability · Accessibility · Privacy · i18n

Acceptance Criteria (BDD)

Scenario Happy path

Given the target repositories, environments, and context are available

When the Hands-on Objectives for this chapter are executed

Then the stated Outcomes/Deliverables for this chapter are produced, reviewed, and published

Definition of Ready: Persona clear; AC drafted; Dependencies known; Estimate set. • **Definition of Done:** All ACs pass; Tests green; Security/a11y checks; Docs updated; Deployed/flagged.

Tasks

- ☐ Enable `stub_status` and test.
- ☐ Export metrics to Prometheus and create basic alerts.
- ☐ Add a Grafana dashboard for key KPIs.

NG-14 — Debugging and Troubleshooting

Epic / Feature	Diagnostics
Business Value	Faster root cause and safer changes via structured logs and trace context.
Priority / Estimate	Priority: Must · SP: 3
Persona	On-call engineer
Dependencies	Central log store or local capture
Assumptions / Risks	Debug logging must be scoped; avoid verbose defaults

Story *As a On-call engineer, I want to Debugging and Troubleshooting so that Faster root cause and safer changes via structured logs and trace context..*

Non-Functional Performance · Security · Reliability · Accessibility · Privacy · i18n

Acceptance Criteria (BDD)

Scenario Happy path

Given the target repositories, environments, and context are available

When the Hands-on Objectives for this chapter are executed

Then the stated Outcomes/Deliverables for this chapter are produced, reviewed, and published

Definition of Ready: Persona clear; AC drafted; Dependencies known; Estimate set. • **Definition of Done:** All ACs pass; Tests green; Security/a11y checks; Docs updated; Deployed/flagged.

Tasks

- ☐ Add a JSON access log with request ID and upstream timing.
- ☐ Enable scoped debug logs for one location.
- ☐ Document a playbook to gather evidence and rollback.

NG-15 — Performance Tuning

Epic / Feature	Throughput and Latency
Business Value	Improve user experience and reduce cost by tuning kernel and server parameters.
Priority / Estimate	Priority: Should · SP: 5
Persona	Performance engineer
Dependencies	Load generator; test plan; baseline configs
Assumptions / Risks	Overtuning can cause regressions under different workloads

Story *As a Performance engineer, I want to Performance Tuning so that Improve user experience and reduce cost by tuning kernel and server parameters..*

Non-Functional Performance · Security · Reliability · Accessibility · Privacy · i18n

Acceptance Criteria (BDD)

Scenario Happy path

Given the target repositories, environments, and context are available

When the Hands-on Objectives for this chapter are executed

Then the stated Outcomes/Deliverables for this chapter are produced, reviewed, and published

Definition of Ready: Persona clear; AC drafted; Dependencies known; Estimate set. • **Definition of Done:** All ACs pass; Tests green; Security/a11y checks; Docs updated; Deployed/flagged.

Tasks

- ☐ Establish baseline metrics with a fixed test.
- ☐ Tune NGINX keepalive, buffers, and workers.
- ☐ Apply relevant `sysctl` parameters and retest.
- ☐ Produce a before/after report with diffs.