

Enterprise-Scale Migrations Using Agentic Workflows with Human-in-the-Loop

Adobe

Who we are?



Alvaro Saurin
Senior Software Engineer



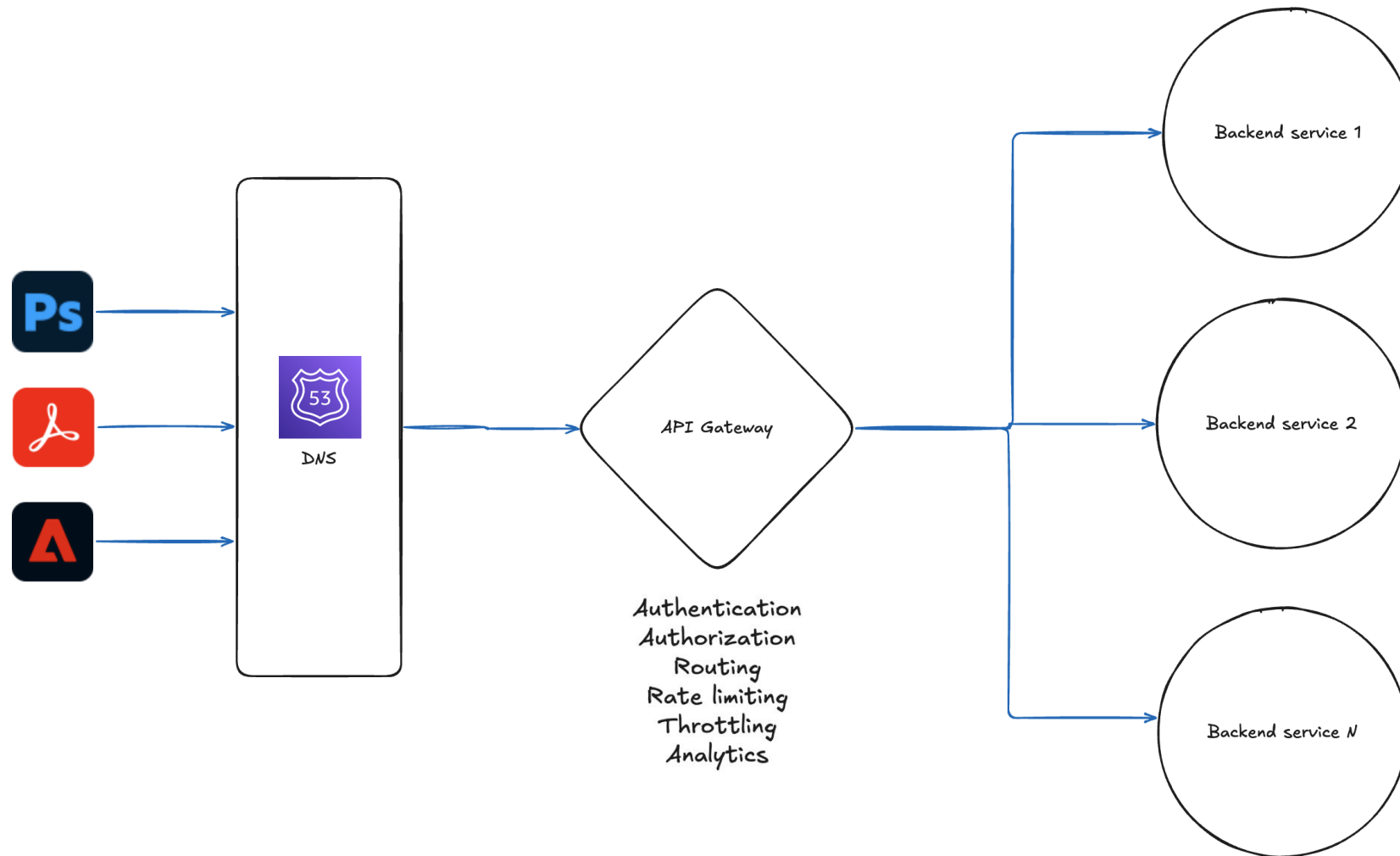
Jose Manuel Navarro
Senior Software Engineer



- Developer Platforms org (~450 people)
- Infrastructure Engineering (~100 people)
- Gateways team (~15 people)

The Context

Traditional API Gateway



API Gateway Stack

Old Gateway



New Gateway



Common stack



Some numbers

12 PiB

Monthly network throughput

~40 billion

Daily requests

~605 billion

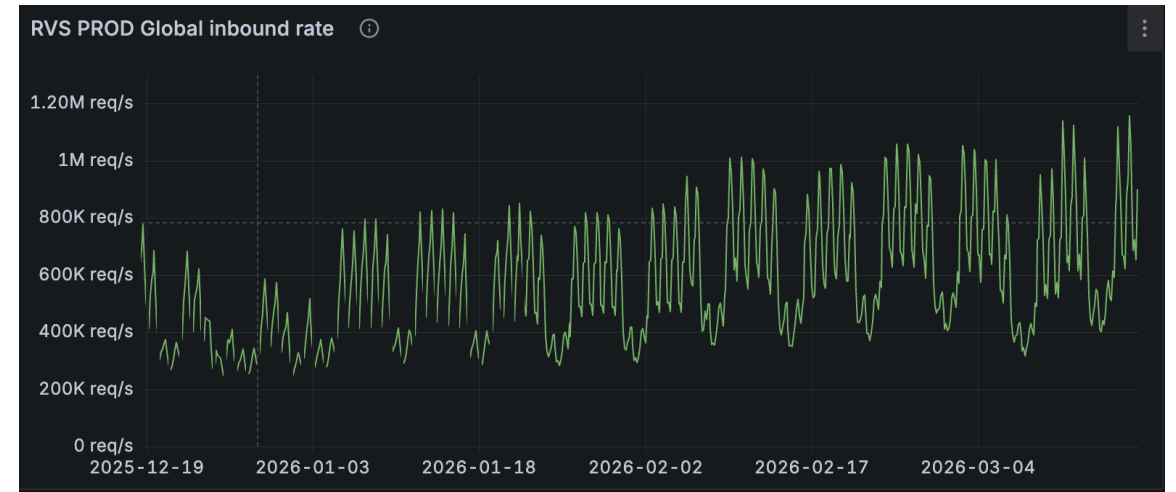
Daily internal requests (1.2M rps peak)

EGW Network Throughput

13.3PB
Network throughput

Total number of EGW requests for the selected time range

1,467,486,199,855
requests



The Challenge

Large-scale migration

- Long history
 - Old gateway running from ~2012
 - New gateway from ~2024
 - New gateway benefits:
 - New platform, more modern, based on GitOps, self-service
- At least 2 environments per service
- No downtime: Critical services (i.e. Creative Cloud, etc.)
- Multi-environment, multi-region, multi-cluster
- Goal: Transparent for users, bullet-proof migration process, no code changes

~2,600

Services running in old gateway

11

Engineers in the team GW team

~500

Kubernetes clusters

80% traffic: Manual migrations

20% traffic: Agentic migrations

Effort Estimations

- 2,600+ services to migrate.
- 2 environments per service
- 3 regions per environment
- Total: 15,600 migrations
- 7 full-time engineers
- 50 working weeks per year.

Optimistic Scenario

10 migrations per week

1,560 weeks (~223 weeks in parallel)

~4.5 years



Pessimistic Scenario

3 migrations per week

5,200 weeks (~743 weeks in parallel)

~15 years



Effort Estimation

- 2,600+ services to migrate
- 2 environments per service
- 3 regions per environment
- Total: 15,600 migrations
- 7 full-time engineers
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parallel)
parallel)

The Solution

Bulk-migrate services

autonomously

involving engineers

only when necessary

The Migration Process

Configuration: NGINX vs Envoy

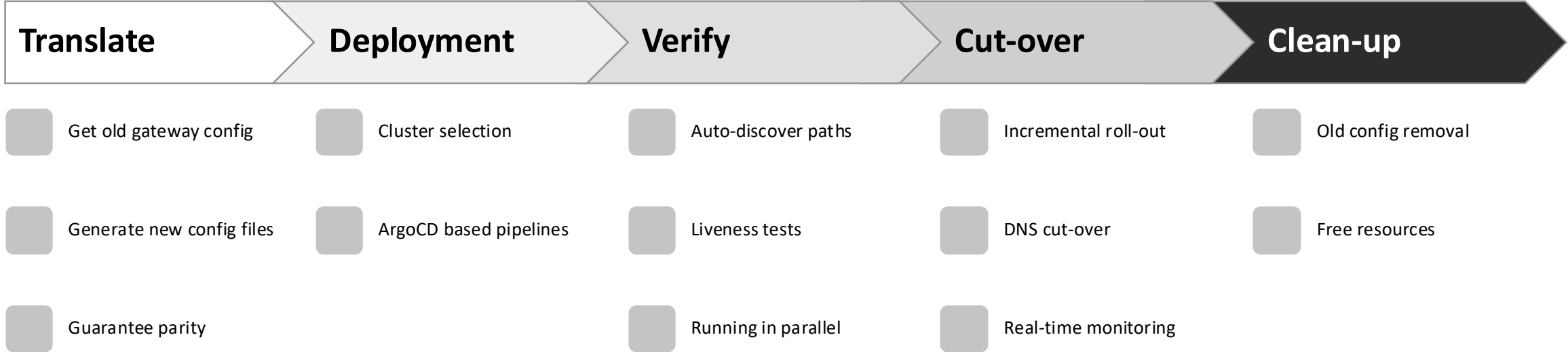
```
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13     oauthToken:
14       ALLOW_ACCESS_TOKEN: "true"
15   urlPatterns:
16     - config:
17       analyticsMetric: ping
18       endpointType: UTILITY
19       urlPrefix: /ping
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21
```

YAML config translated to NGINX config

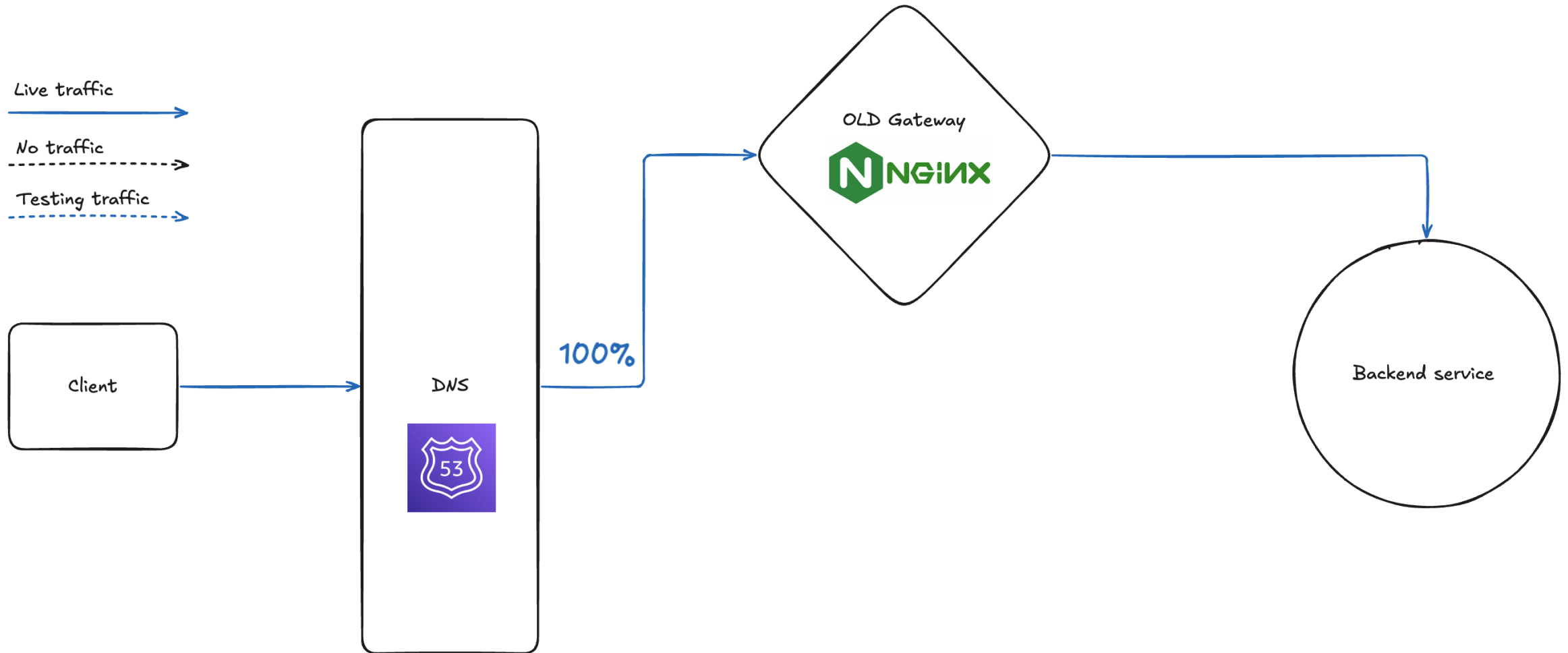
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```

- values.yaml
- Stored in ArgoCD repositories
- Translated to HTTPProxy resources
- GitOps, Self-service

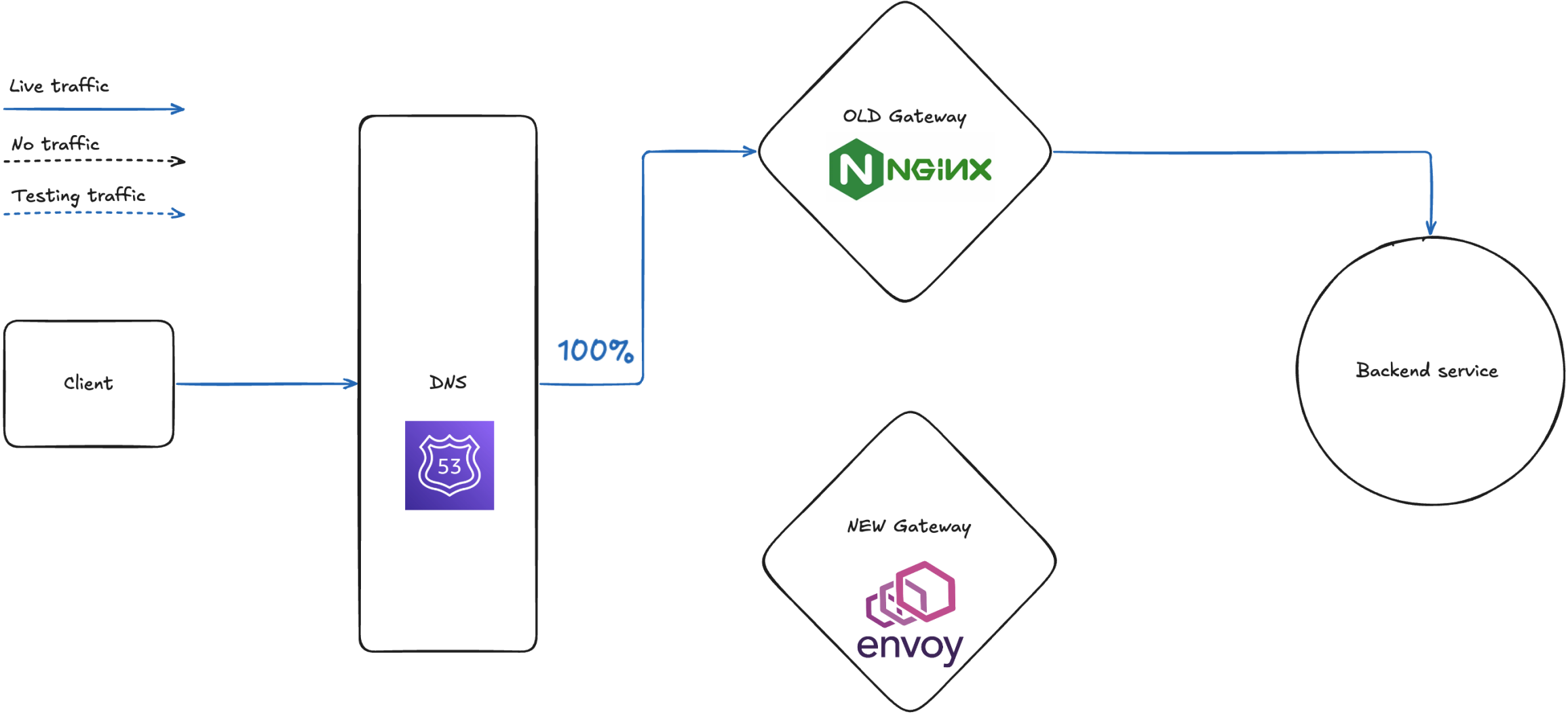
The Migration Process



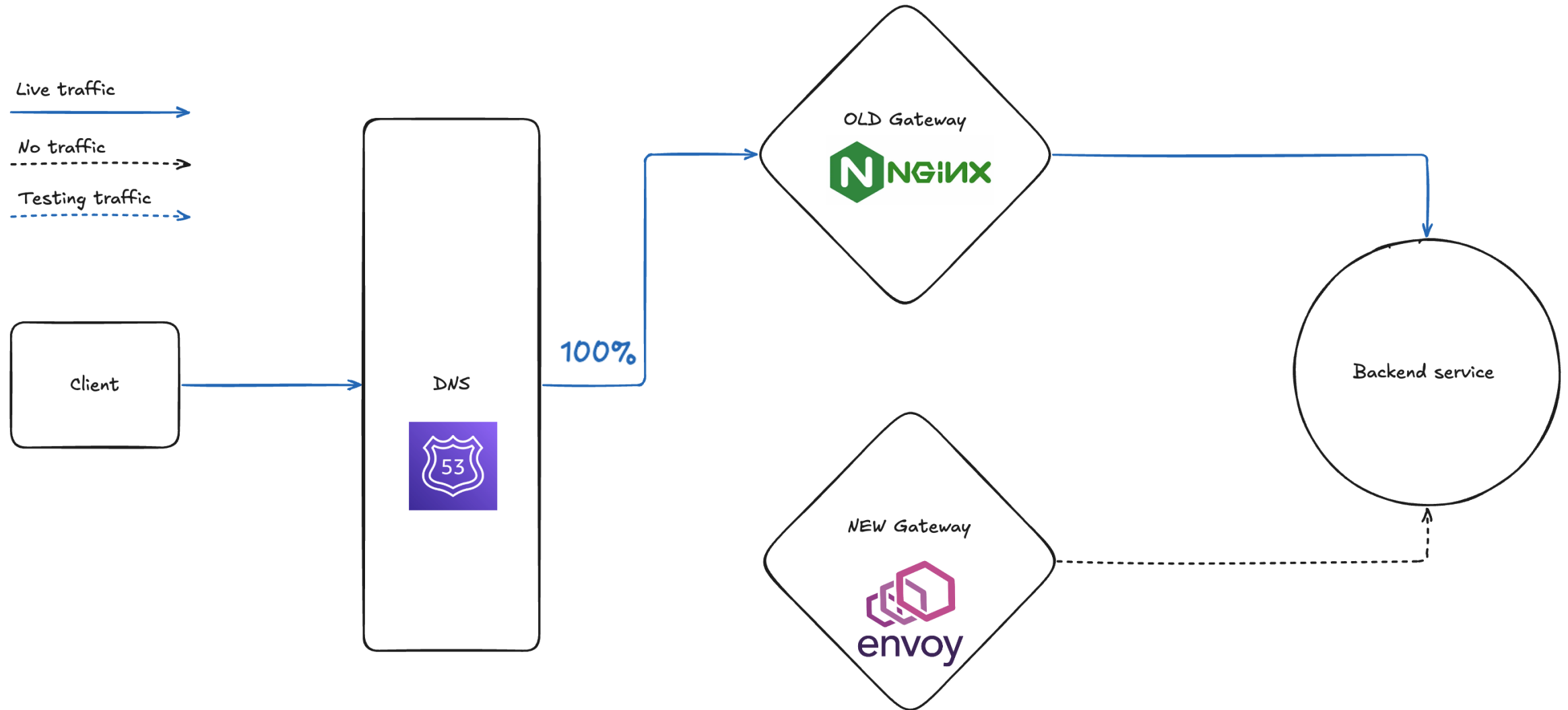
Initial State



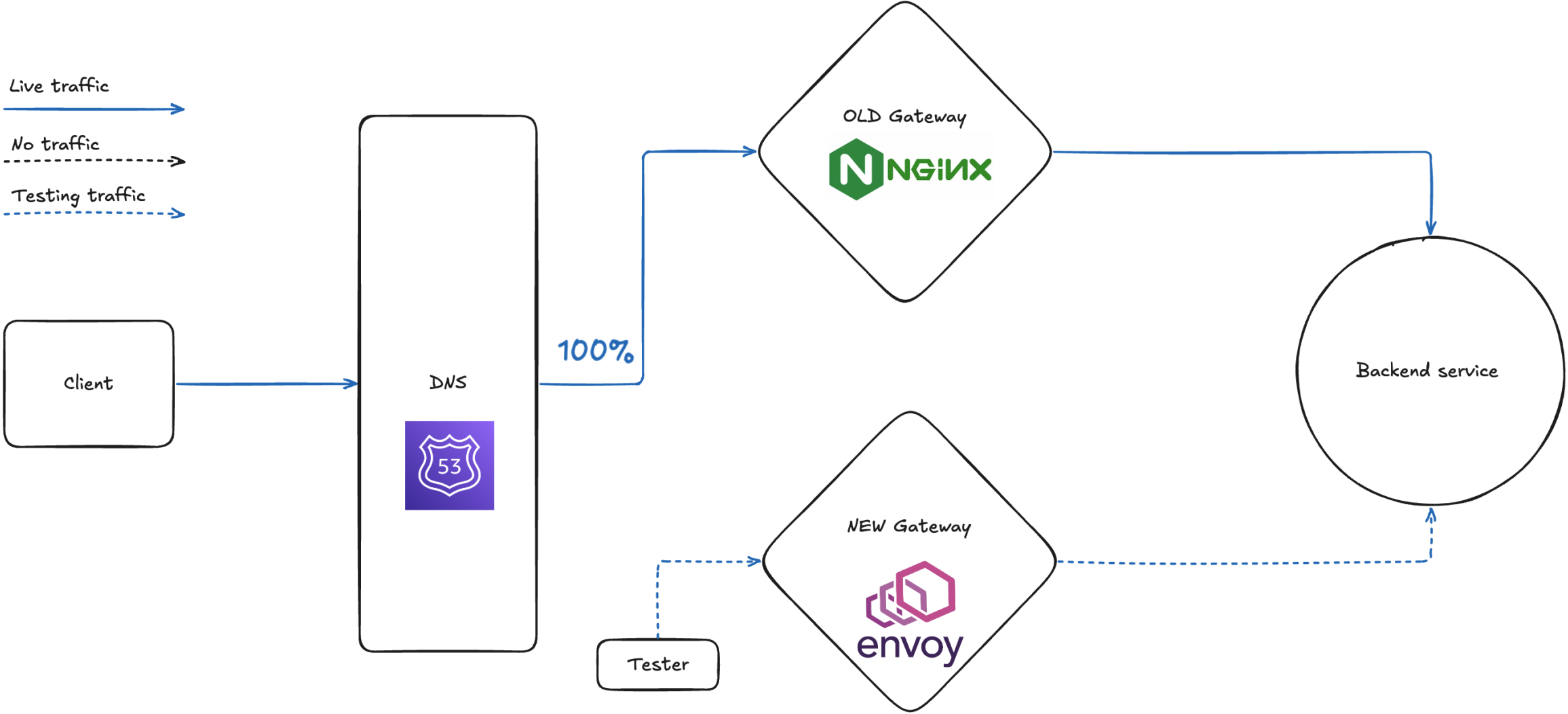
Translation



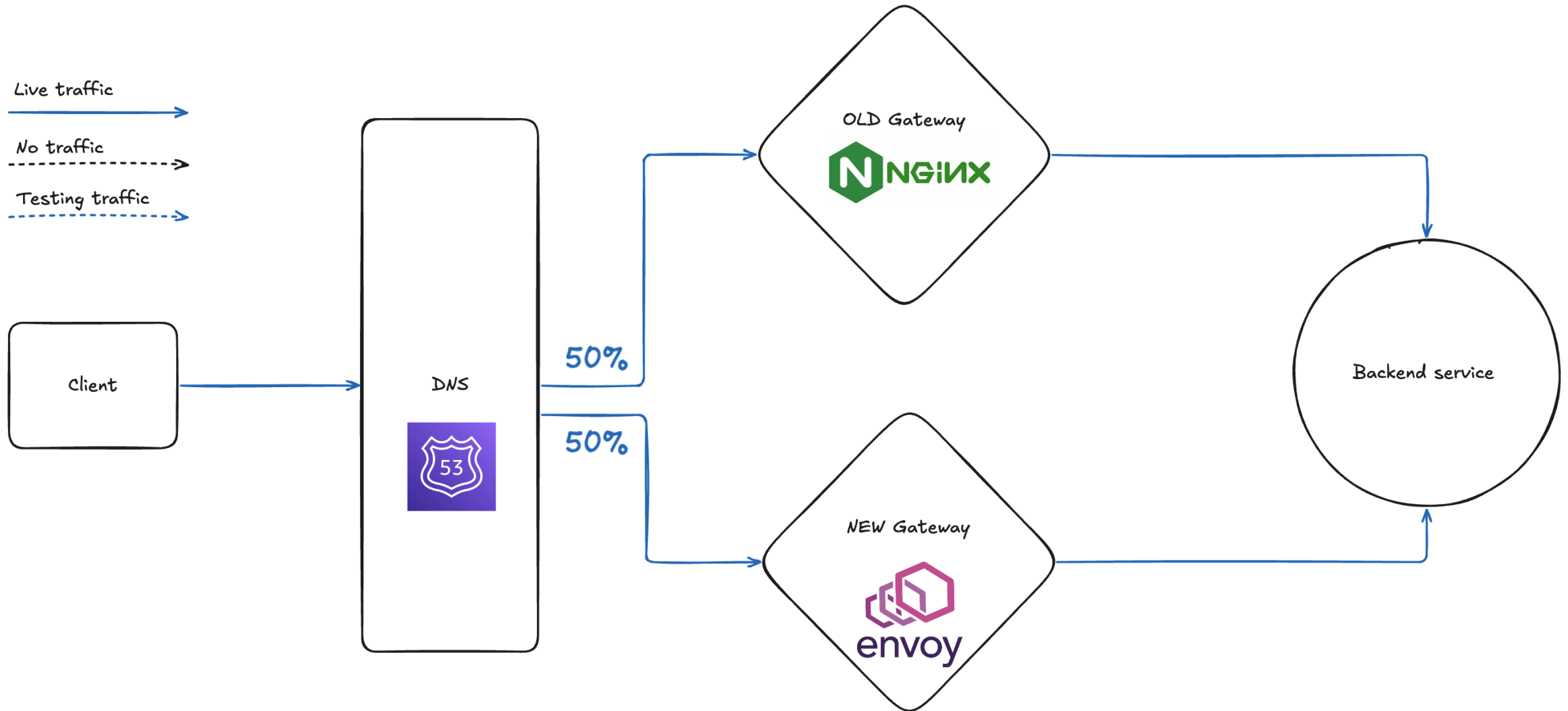
Deployment



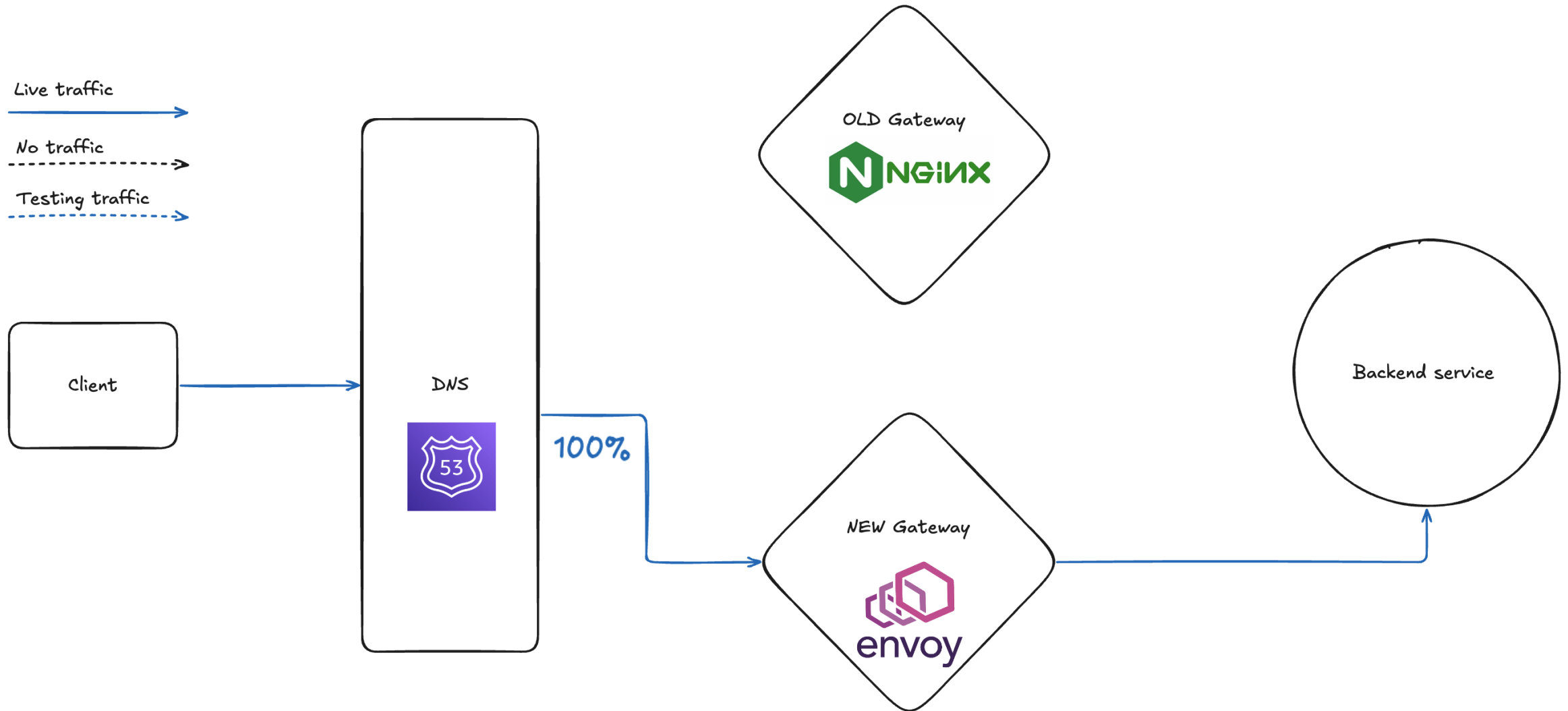
Verification



Cut-over



Clean-up



Translation (1st Iteration)

Translation: (Naïve) LLM-based

```
1 configs:
2   MggVCf8KN6vAtTYhFF6Nz6G4jbkS8Kys:
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Translate

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```

this is not just *"transform a YAML into another YAML"*



"Maybe LLMs could help us..."

Translation: (Naïve) LLM-based

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LLM

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- Translate to **different schema** isn't easy for LLMs
- **Regressions** in the process
- Training LLMs require A LOT of **manual translations**

Translation: (Naïve) LLM-based

```
1 configs:
2   MgqVCf8KN6vAtTYhFF6Nz6G4jbKS8Kyr
3   context: my-service
4   environments:
5     - name: st
6
7   name: prod
8
9   name: dev
10  ...
11  request
12    apiKey
13    oauth
14    ALLCO
15    urlPattern: "/api/*"
16    - config:
17      analyt
18      endpoint
19      urlPrefix
20  ...
```

→

```
1 /helm
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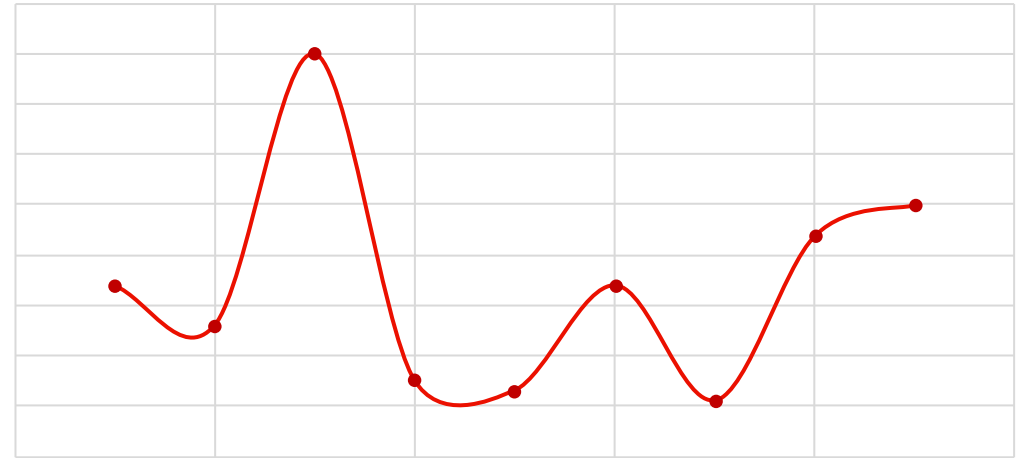
- Translate to different schema, not easy for LLMs
- Regressions in the model
- Training LLMs require A LOT of manual translations

Translation (2nd Iteration)

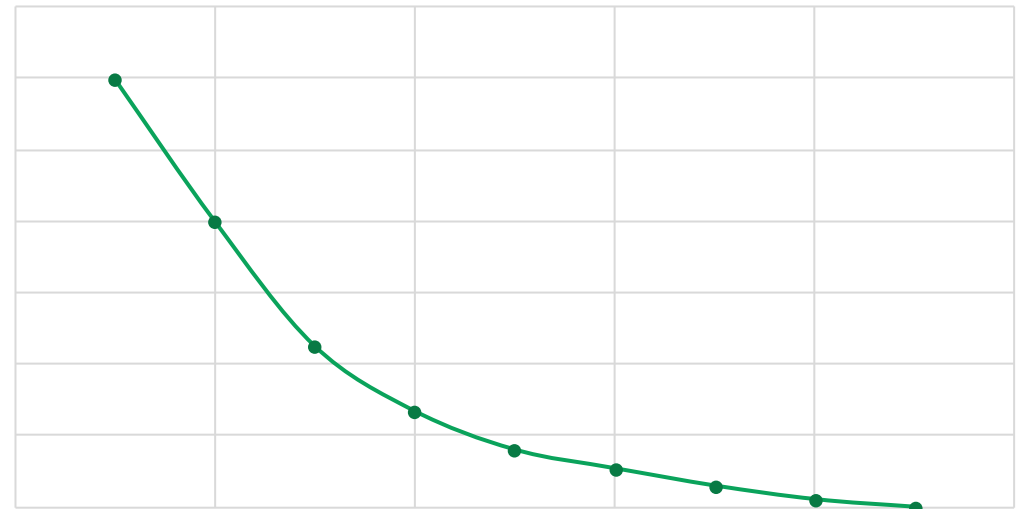
Translation | New approach

- LLMs translating config didn't work
- We need a deterministic approach: same input -> same output
- LLMs are very good generating code
- Code execution is always deterministic
- IDEA: AI evolves the code: quality should converge to zero errors

translation errors: with LLMs



translation errors: with code



Translation: (Naïve) LLM-based

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Tool

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Tool



Agent builds the tool

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```



Agent builds *the tool*



Engineer drives *the agent*

Translation | The Inner Loop

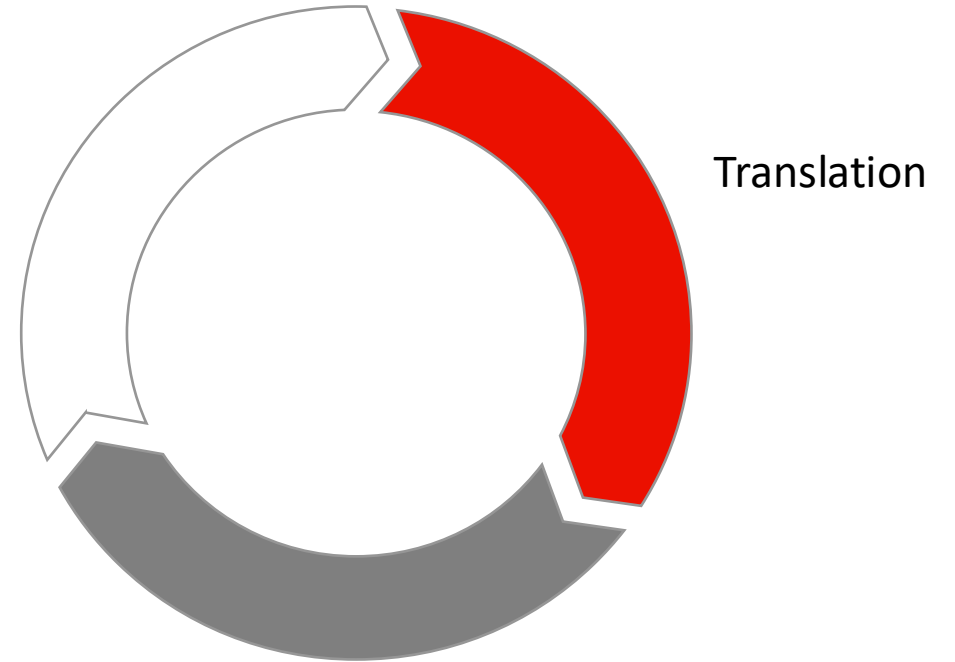
1. Use the tool to translate a service

This produces

- translated config
- logs and intermediate files

to give the human and the agent

Both agent and human must **understand** what happened

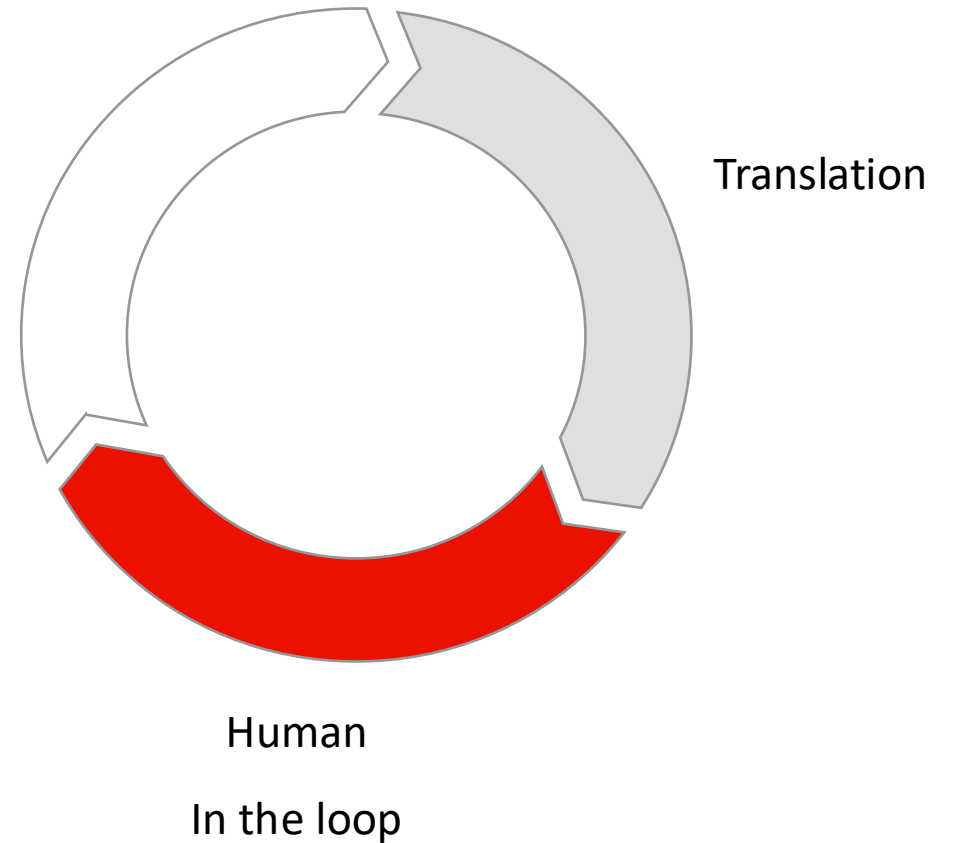


Translation | The Inner Loop

1. Use the tool to translate a service

2. Human in the loop

Review translation, find errors, schema inconsistencies, config not translated, etc



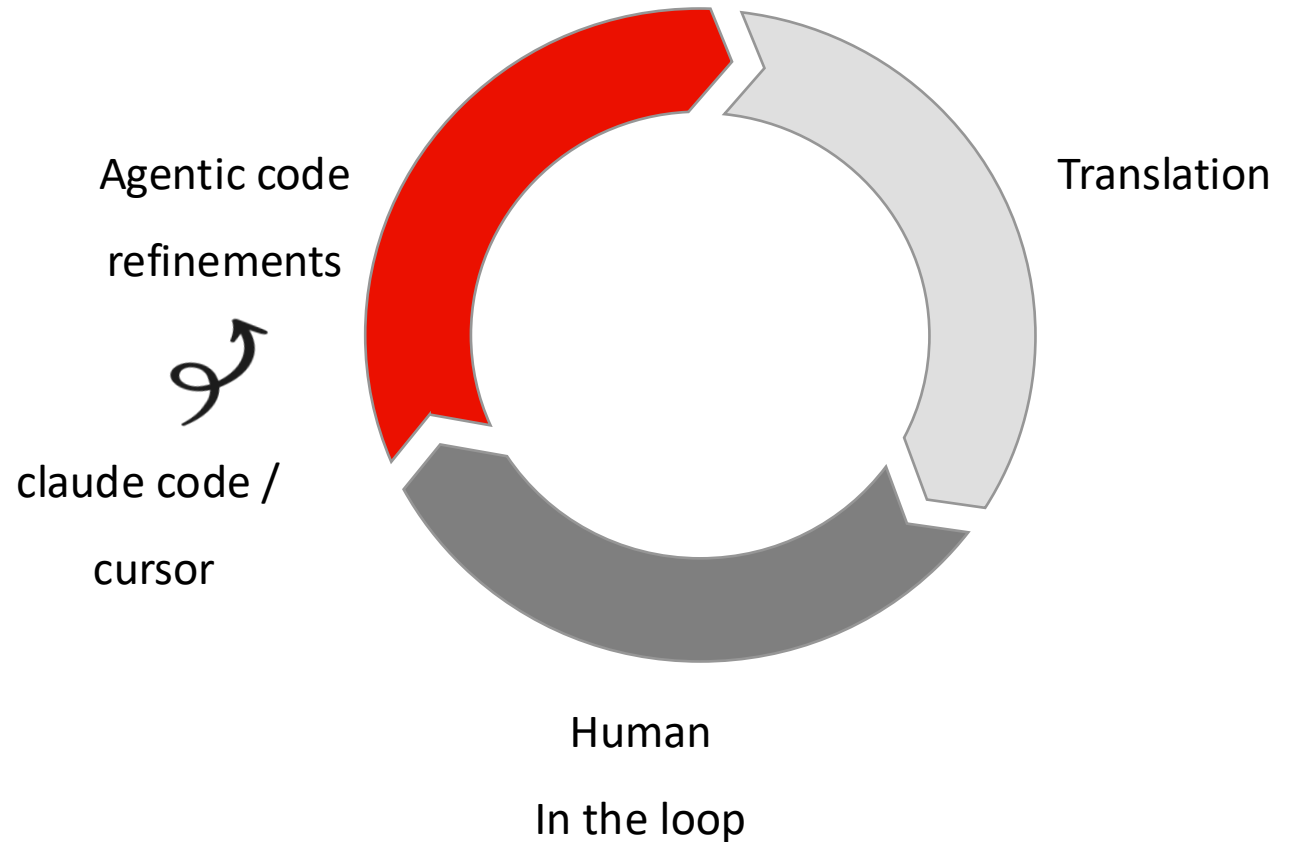
Translation | The Inner Loop

1. Use the tool to translate a service
2. Human in the loop
3. Agentic code refinements:

This is what I expected

This is what you produced

These are the logs



Translation | The Inner Loop

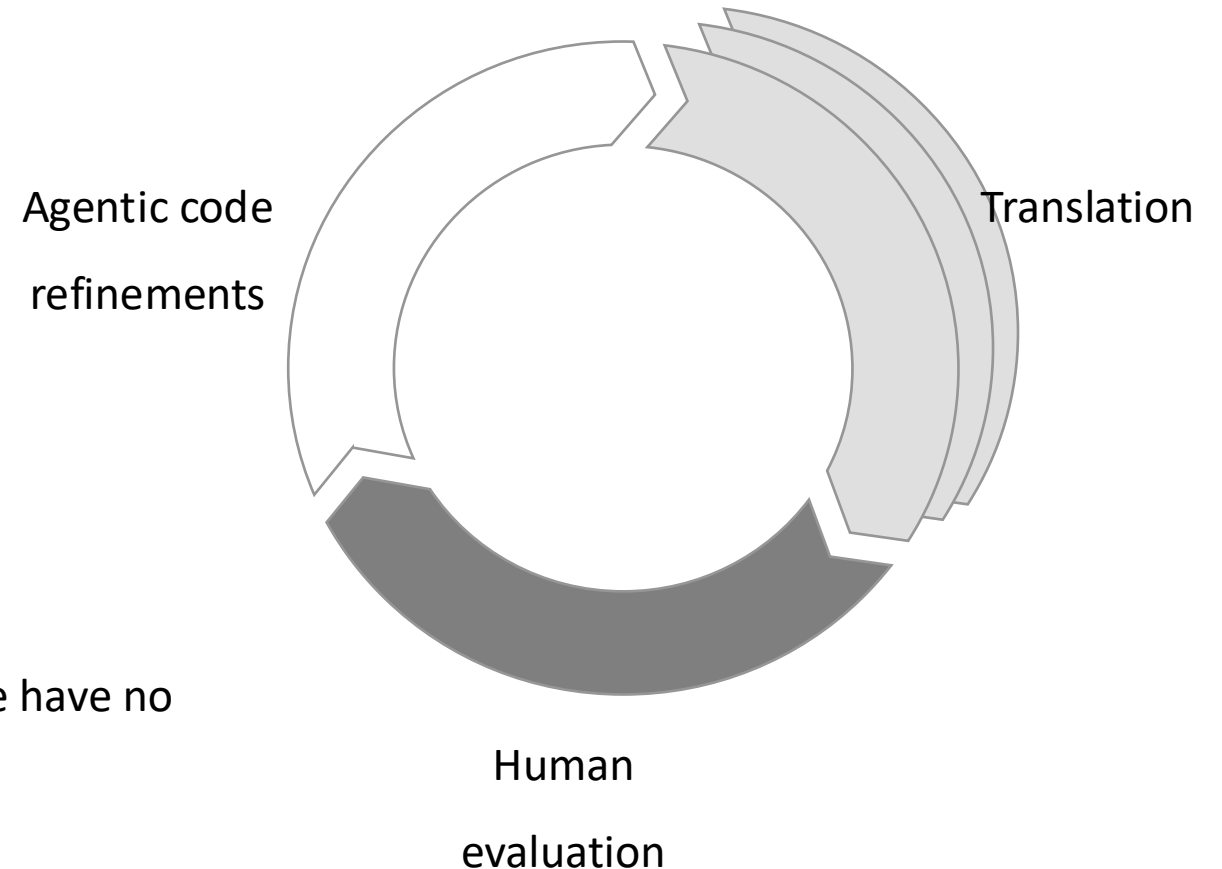
1. Use the tool to translate a services
2. Human in the loop
3. Agentic code refinements
4. Loop until no errors

Cumulative process, the more iterations, the fewer errors.

Previous translations become golden-files for checking we have no regressions.

The **goal** is to **refine the tool**, without regressions.

Converge, reducing the “Human Evaluation” step.

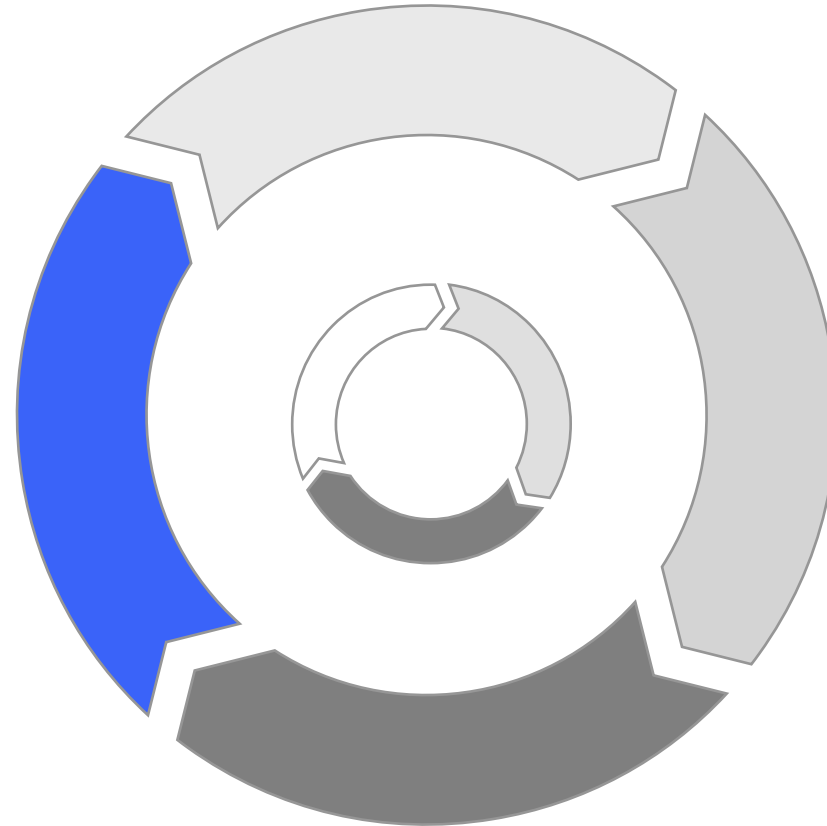


Roll-out | The Outer Loop

1. Test endpoints health:

Discover valid paths and test them sending end-to-end requests

Test endpoints
health

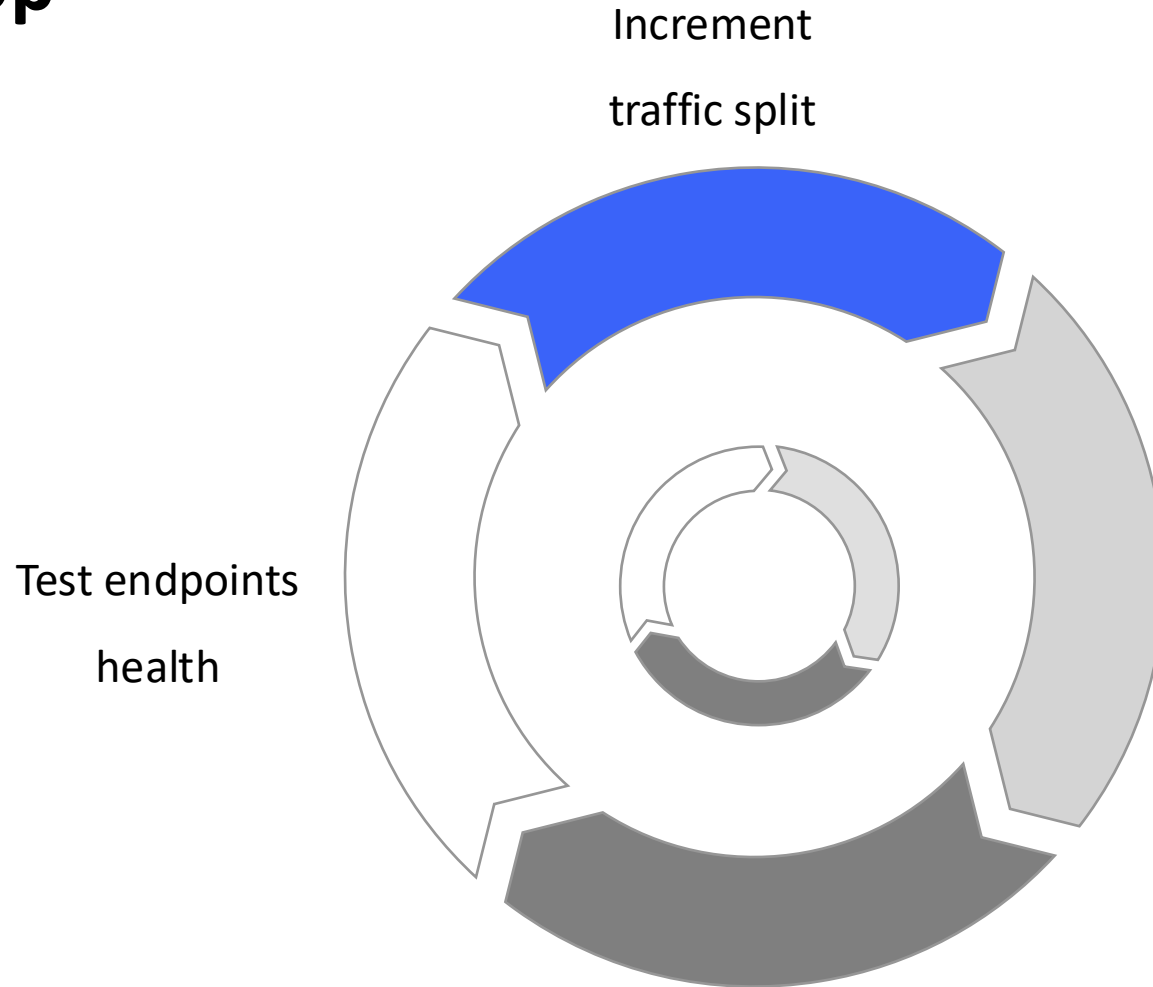


Roll-out | The Outer Loop

1. Test endpoints health

2. Increment traffic split:

Change the DNS to increase the traffic gradually in the new gateway



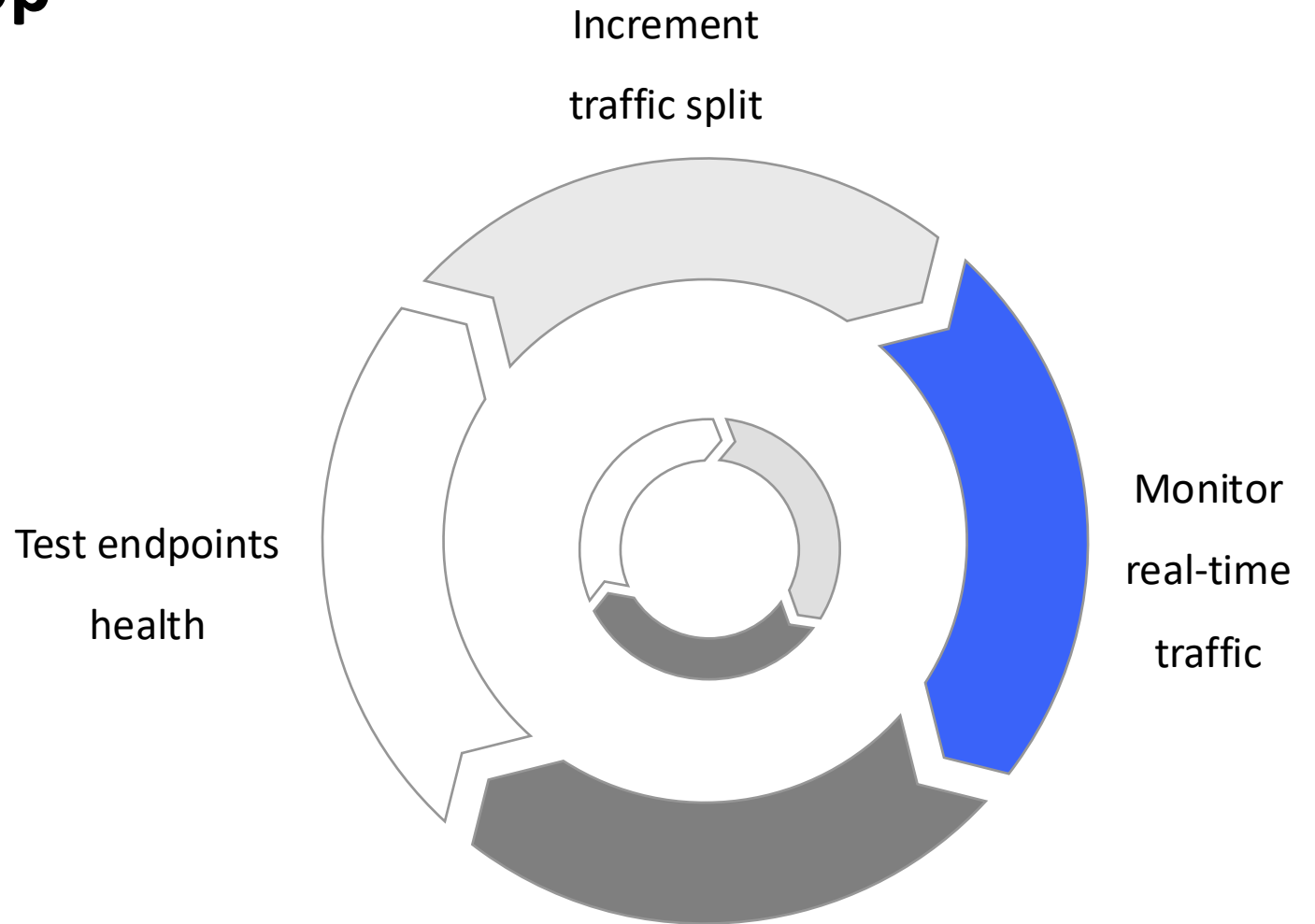
Roll-out | The Outer Loop

1. Test endpoints health

2. Increment traffic split

3. Monitor real-time traffic:

Check RED metrics in the monitoring system (Splunk, Otel, Cortex...) and compare against new gateway metrics

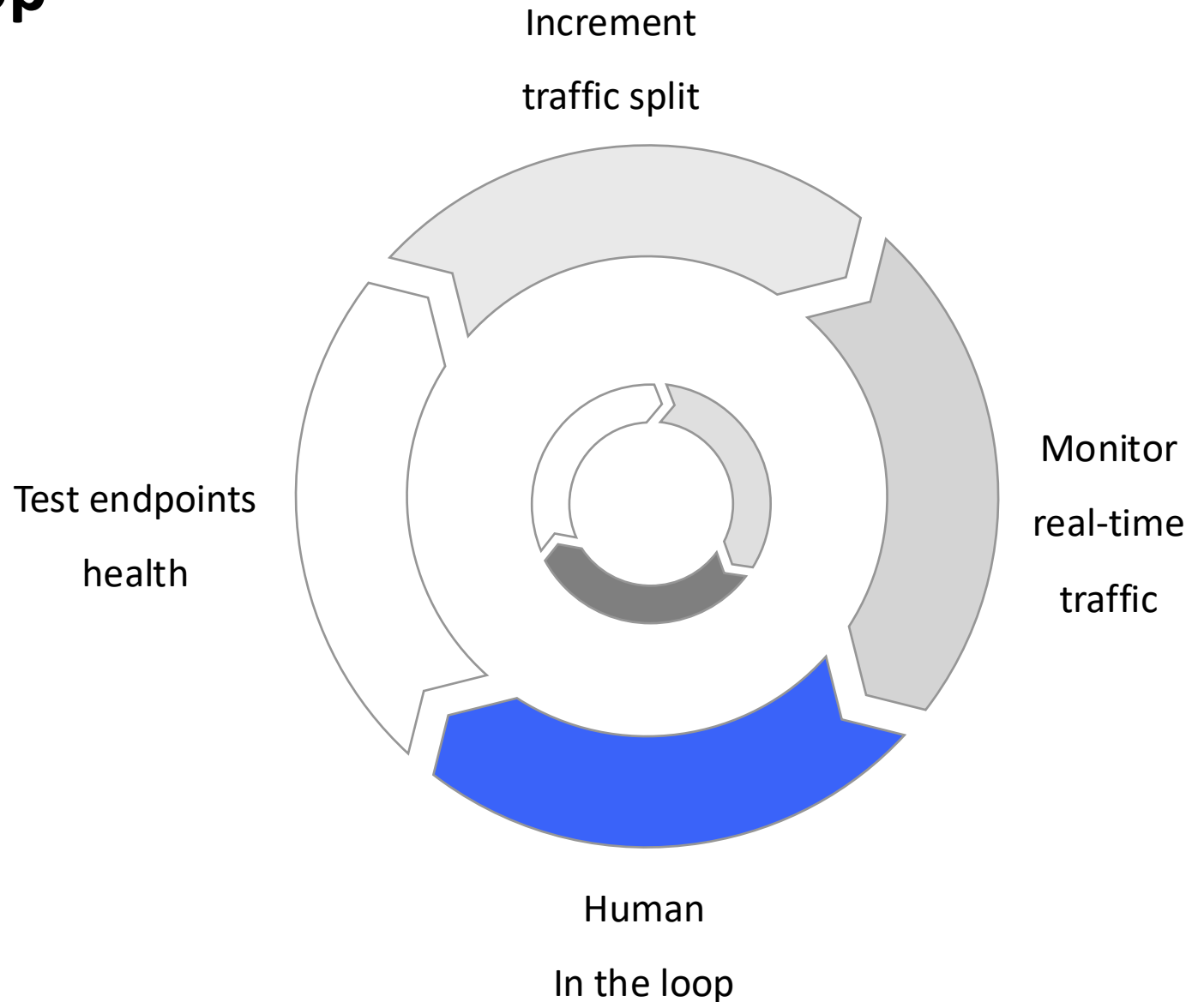


Roll-out | The Outer Loop

1. Test endpoints health
2. Increment traffic split
3. Monitor real-time traffic
4. Human in the loop

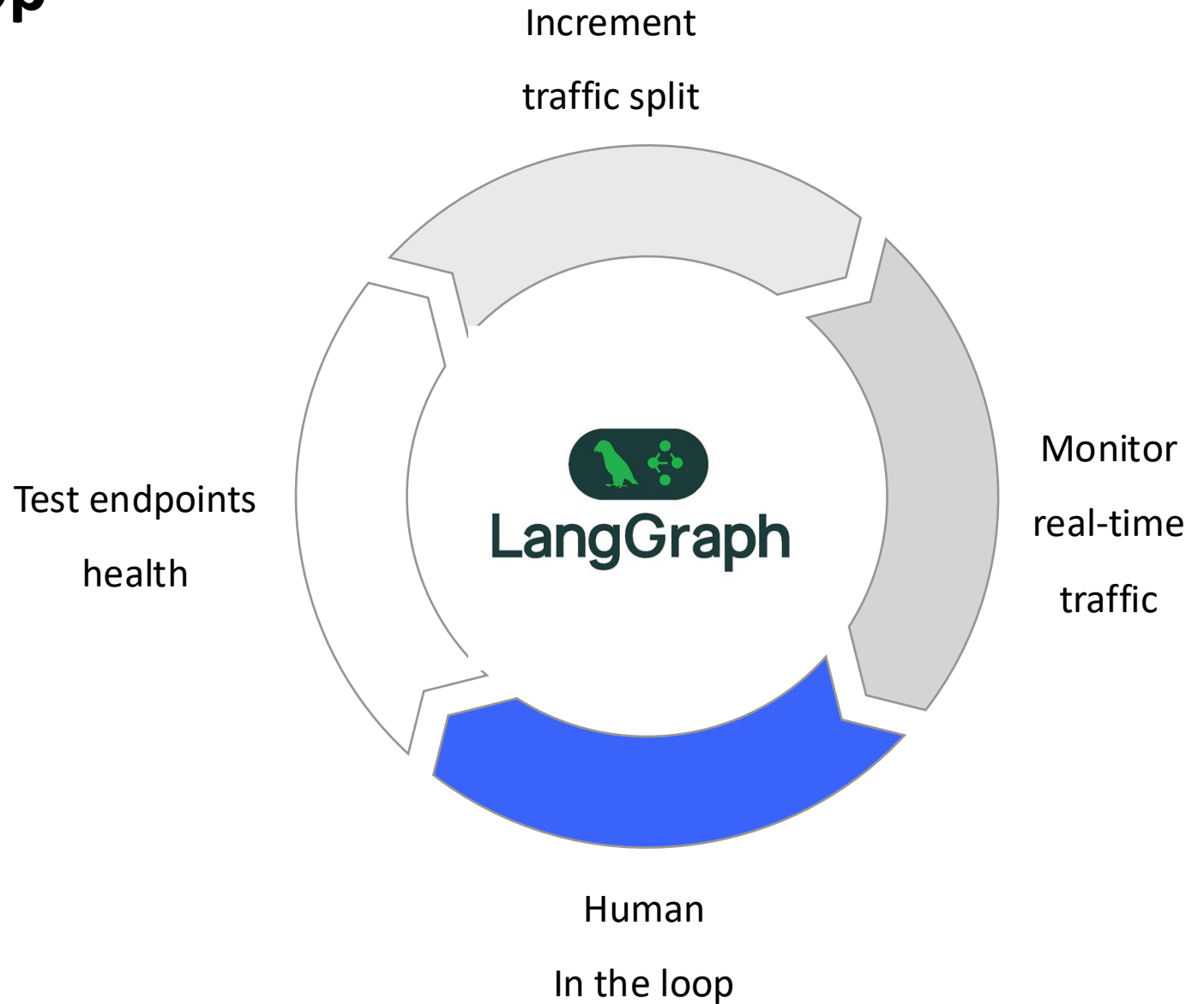
Only if metrics don't match, confirm with the user if she wants to:

- Rollback to initial state
- Move forward the cutover to next env/region



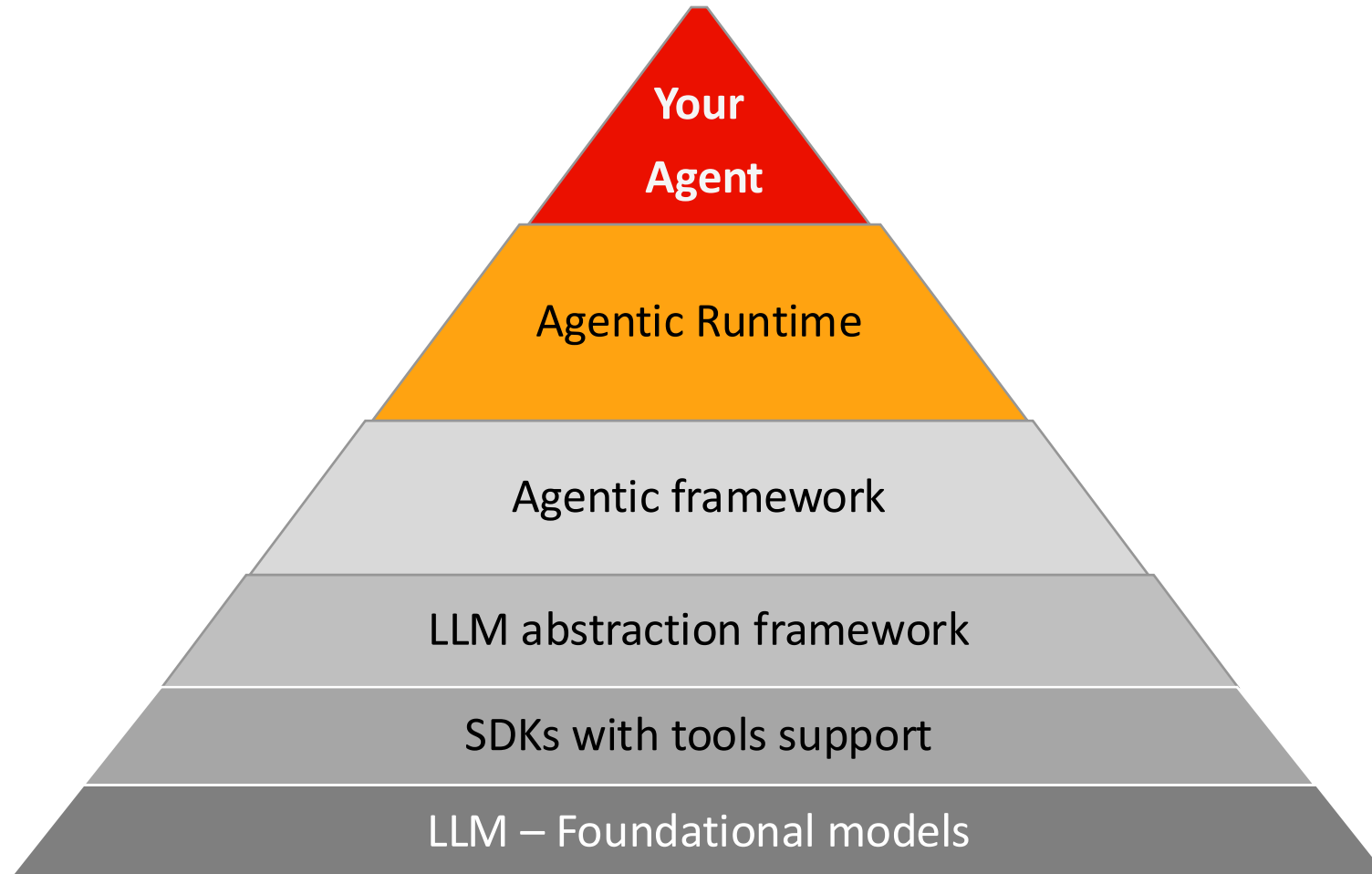
Roll-out | The Outer Loop

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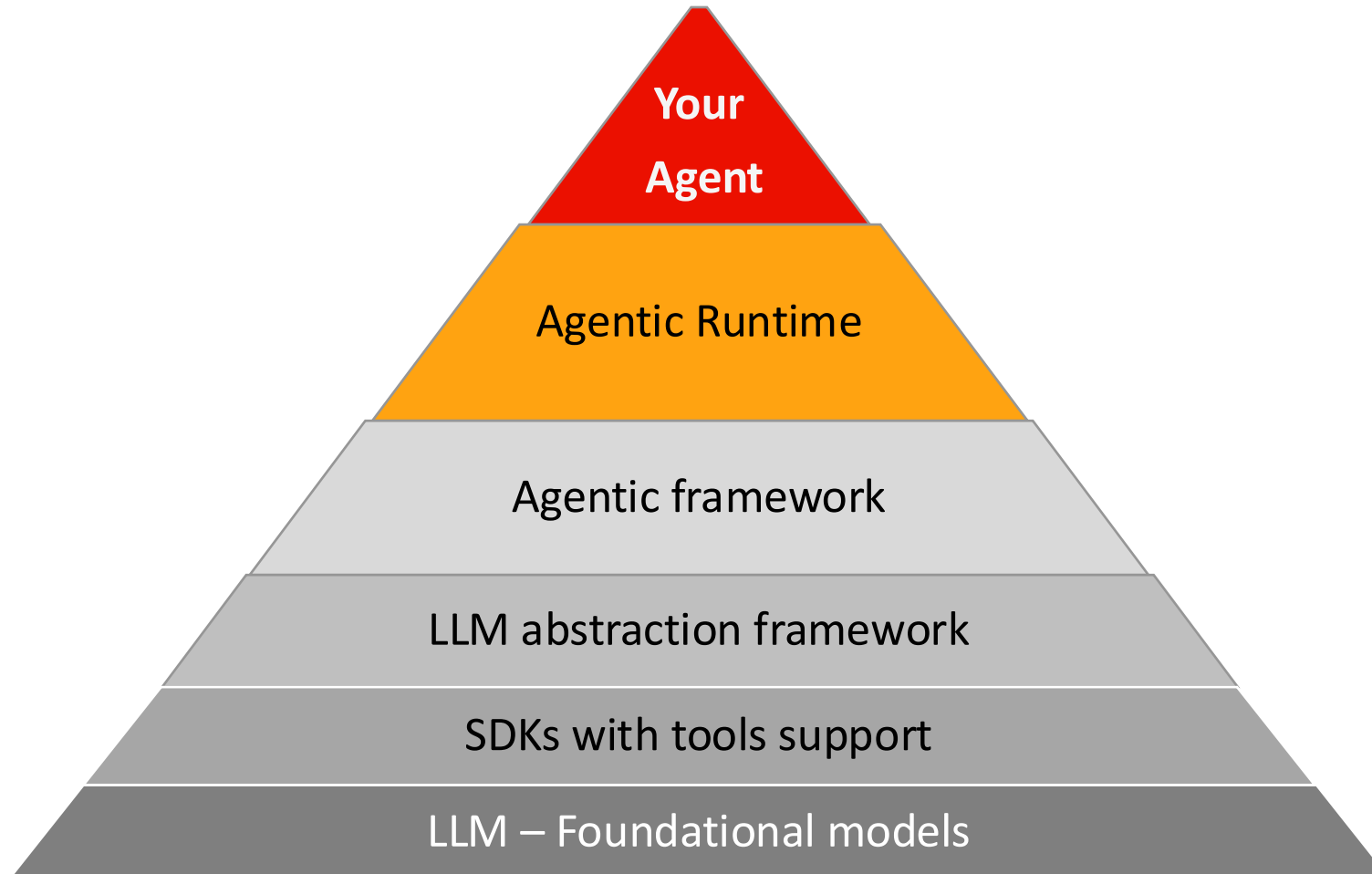


Custom Agent

Agentic Stack



Agentic Stack

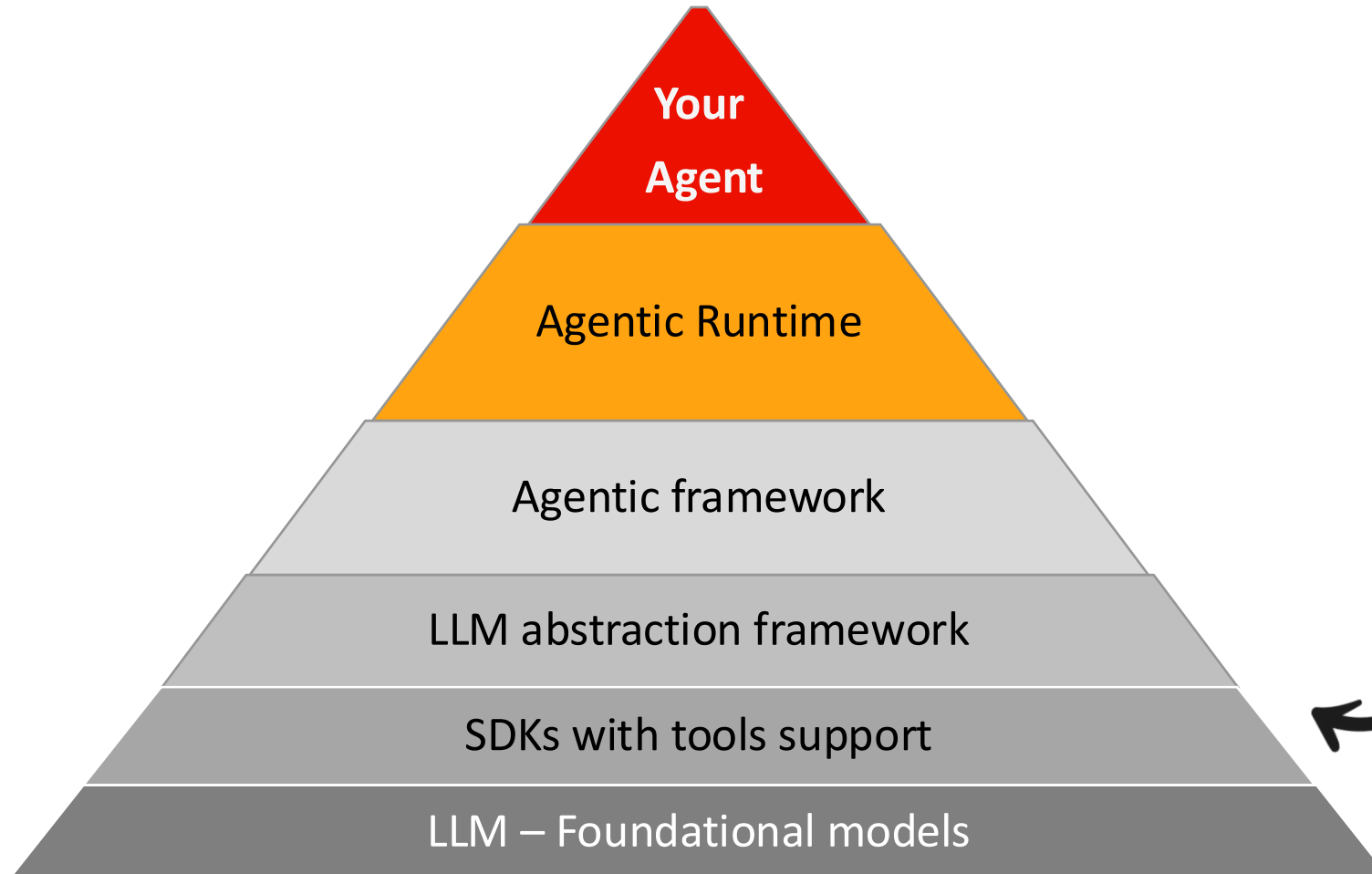


Opus/Sonnet
GPT/Codex
Gemini
...

Agentic Stack

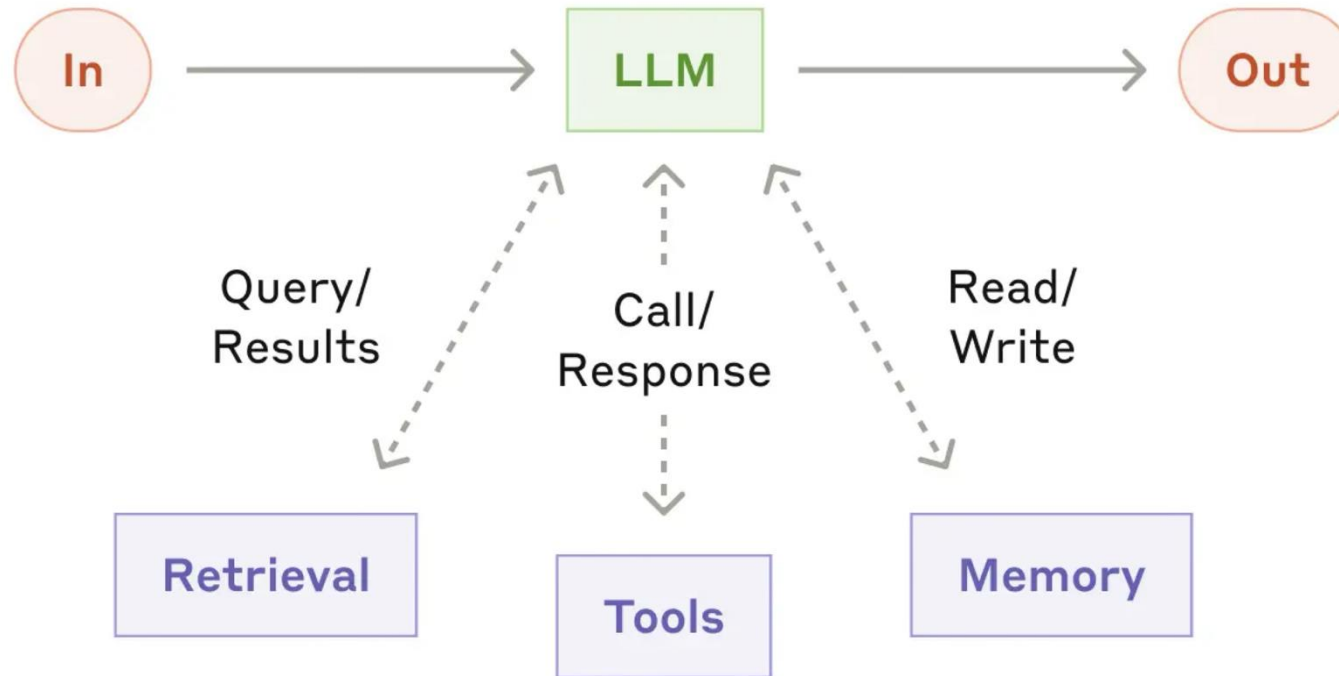


Agentic Stack

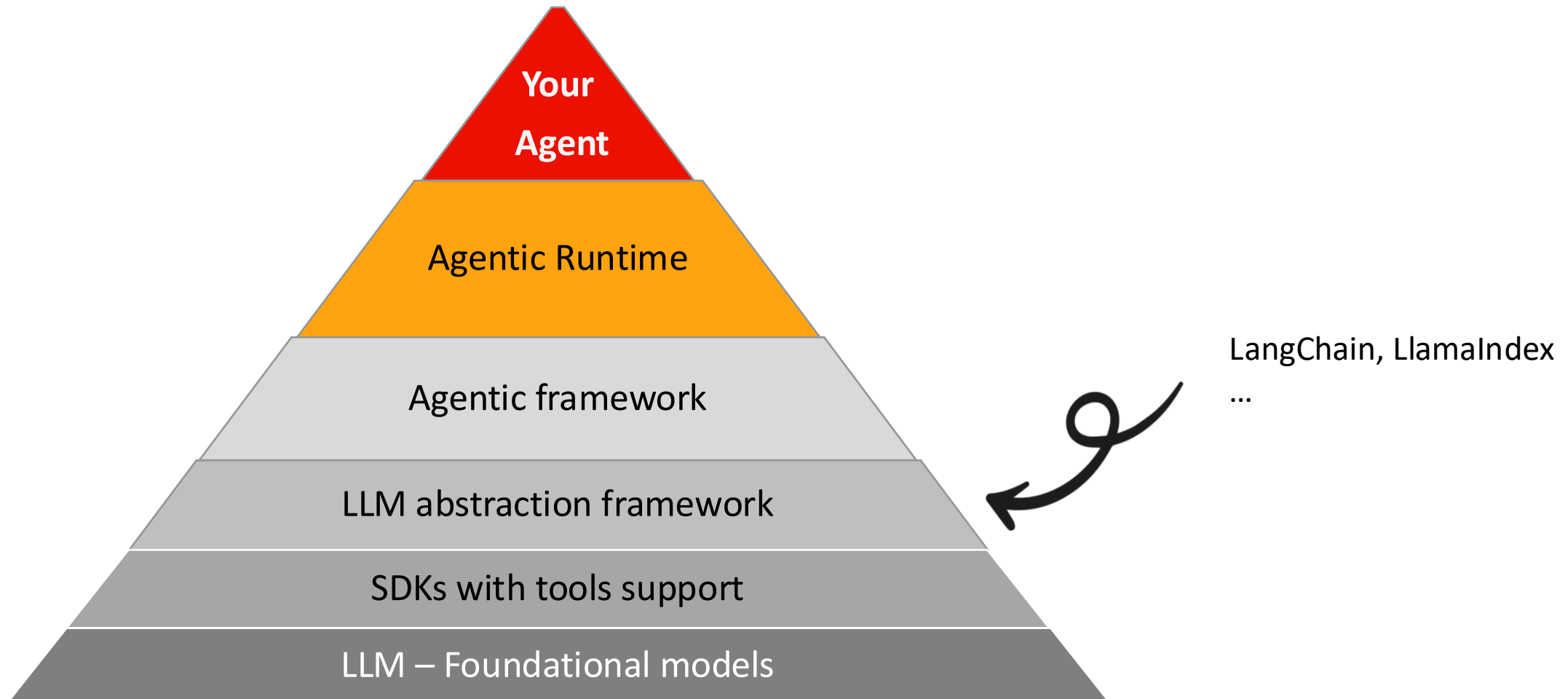


openai-python
npm's
@google/generative-ai
pip install anthropic
...

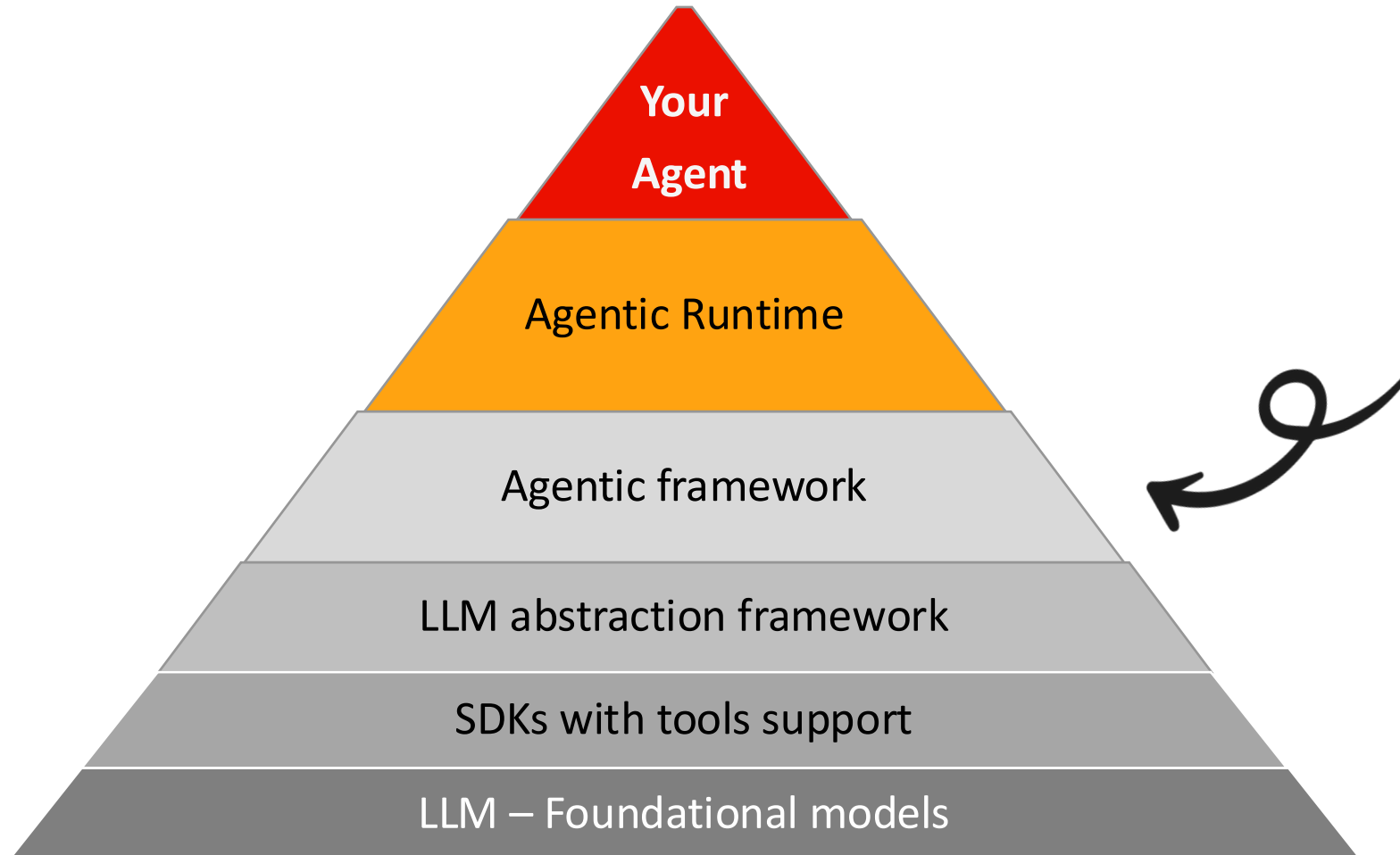
Agentic Stack



Agentic Stack

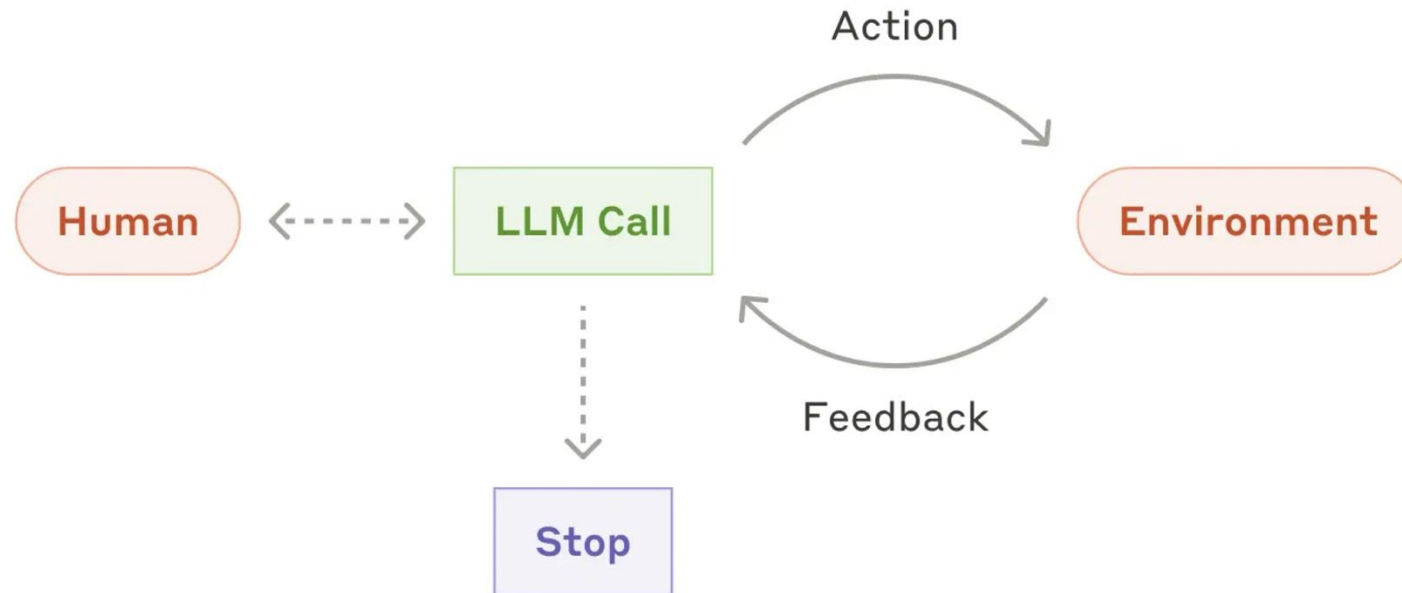


Agentic Stack

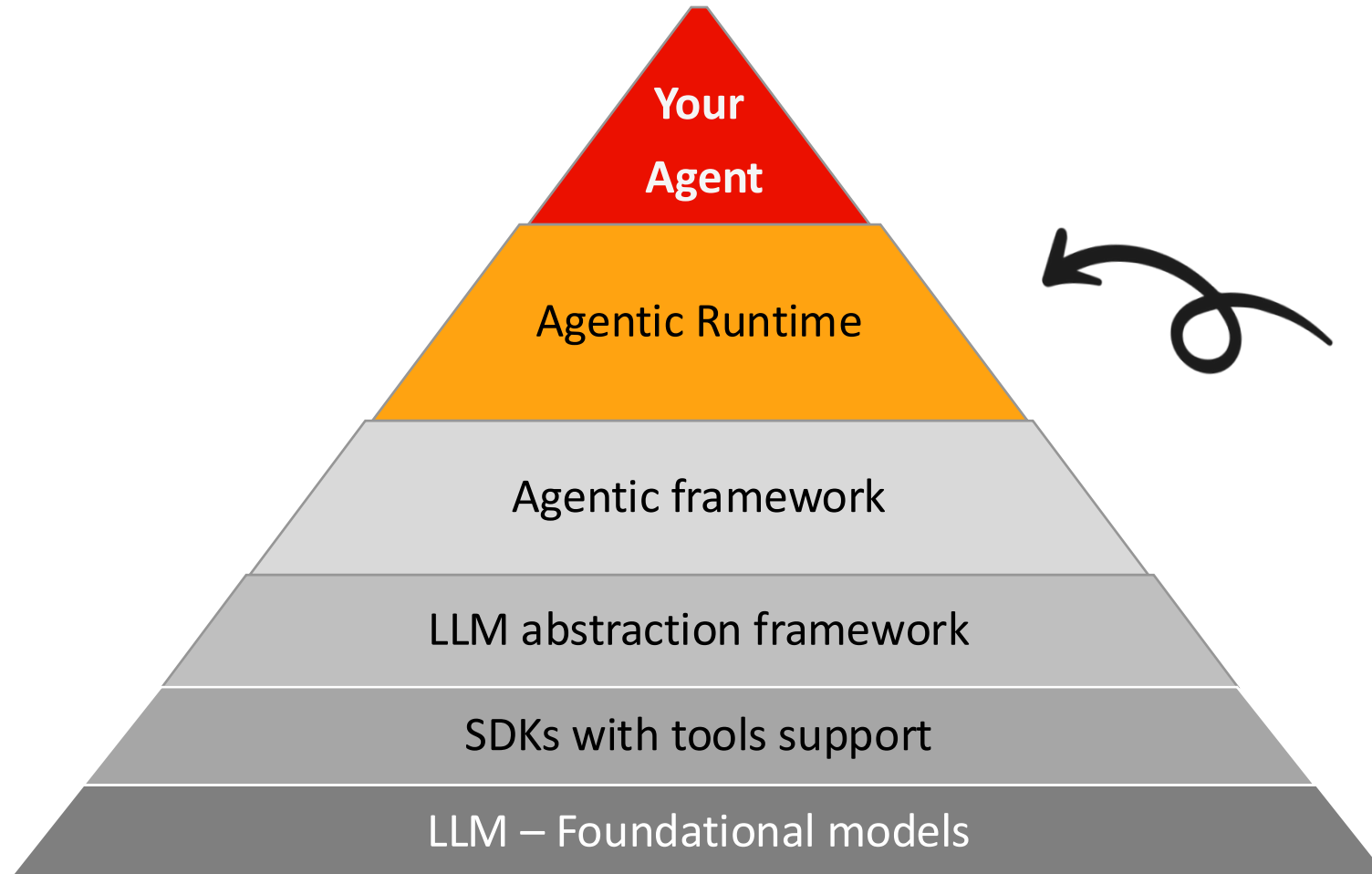


LangGraph, AutoGen,
CrewAI...

Agentic Stack



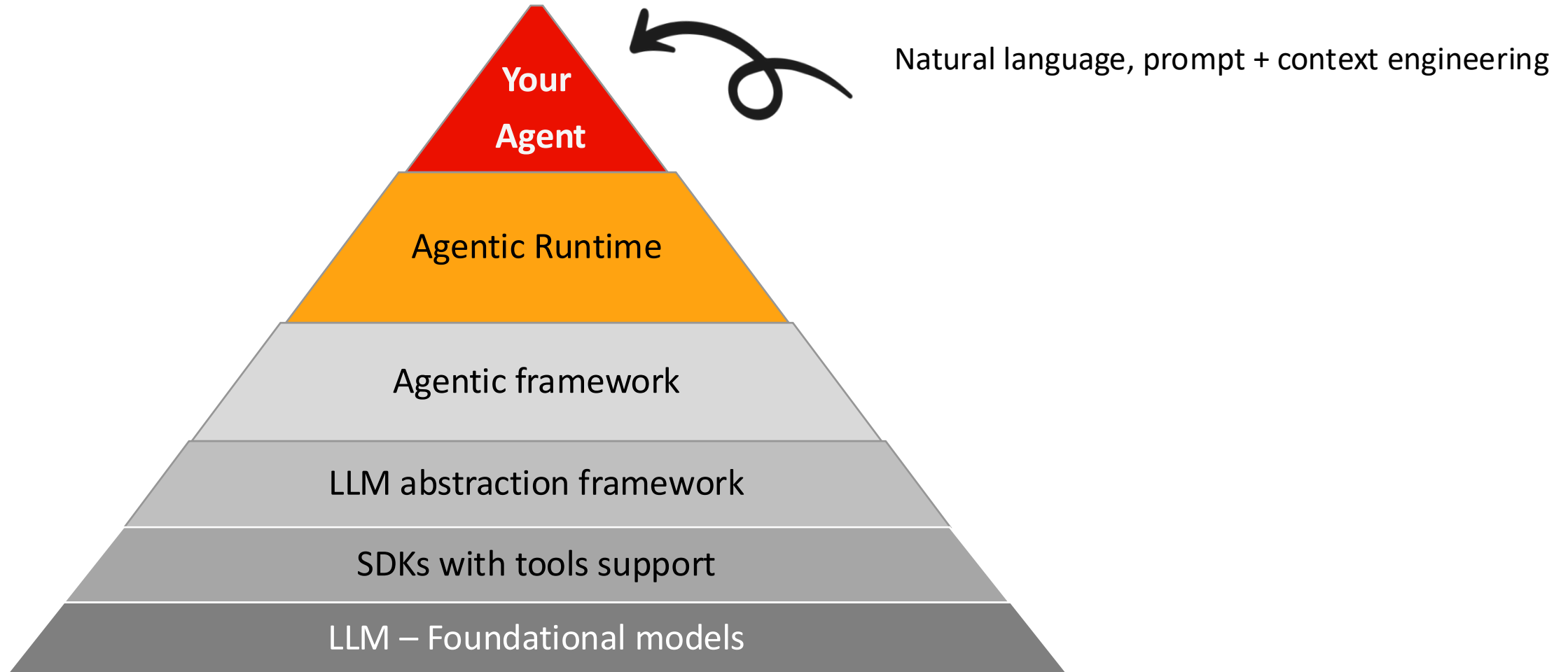
Agentic Stack



Home-made, custom code (python):

- System prompt
- Context
- guard rails
- agent loop
- etc.

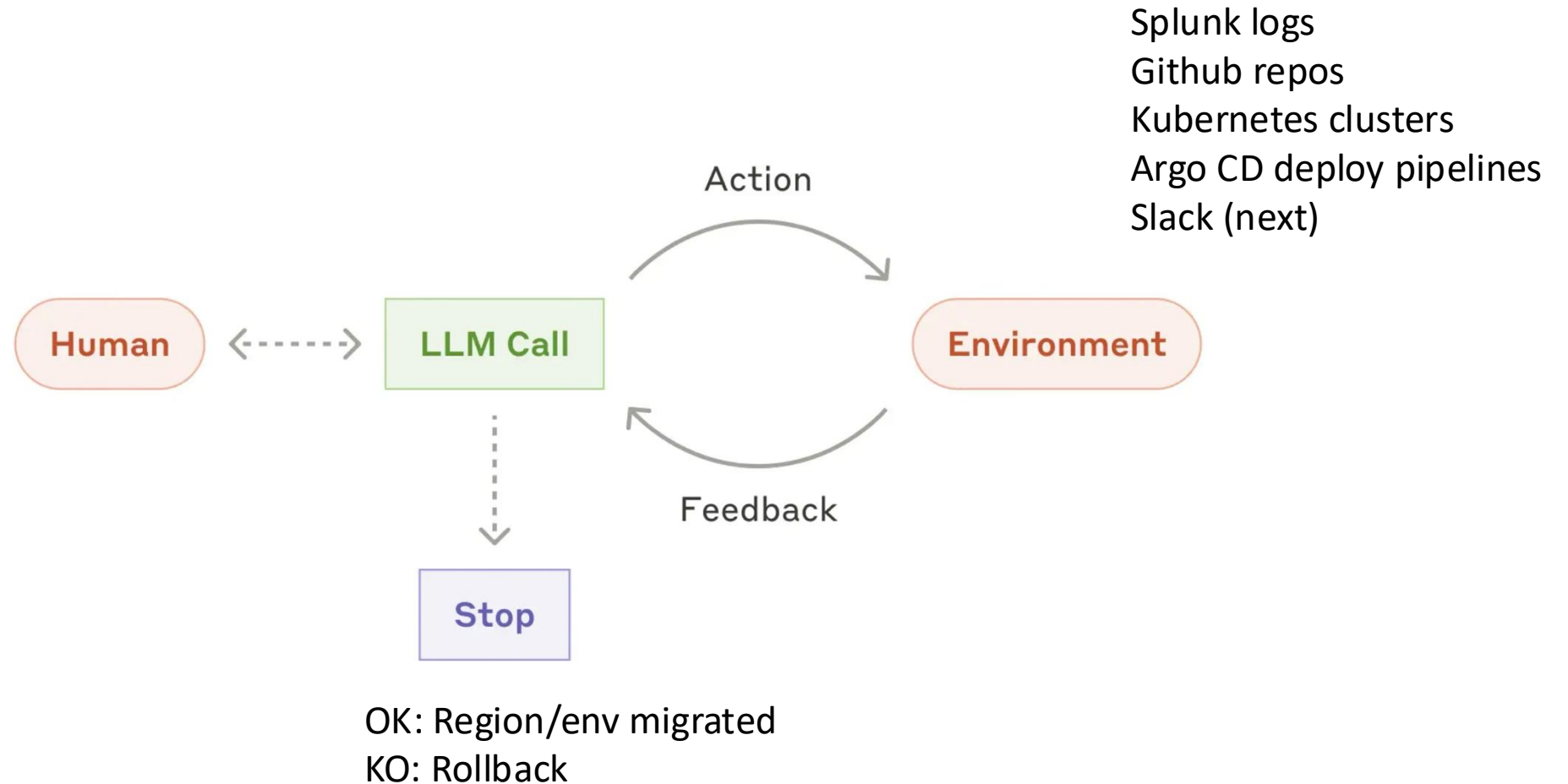
Agentic Stack



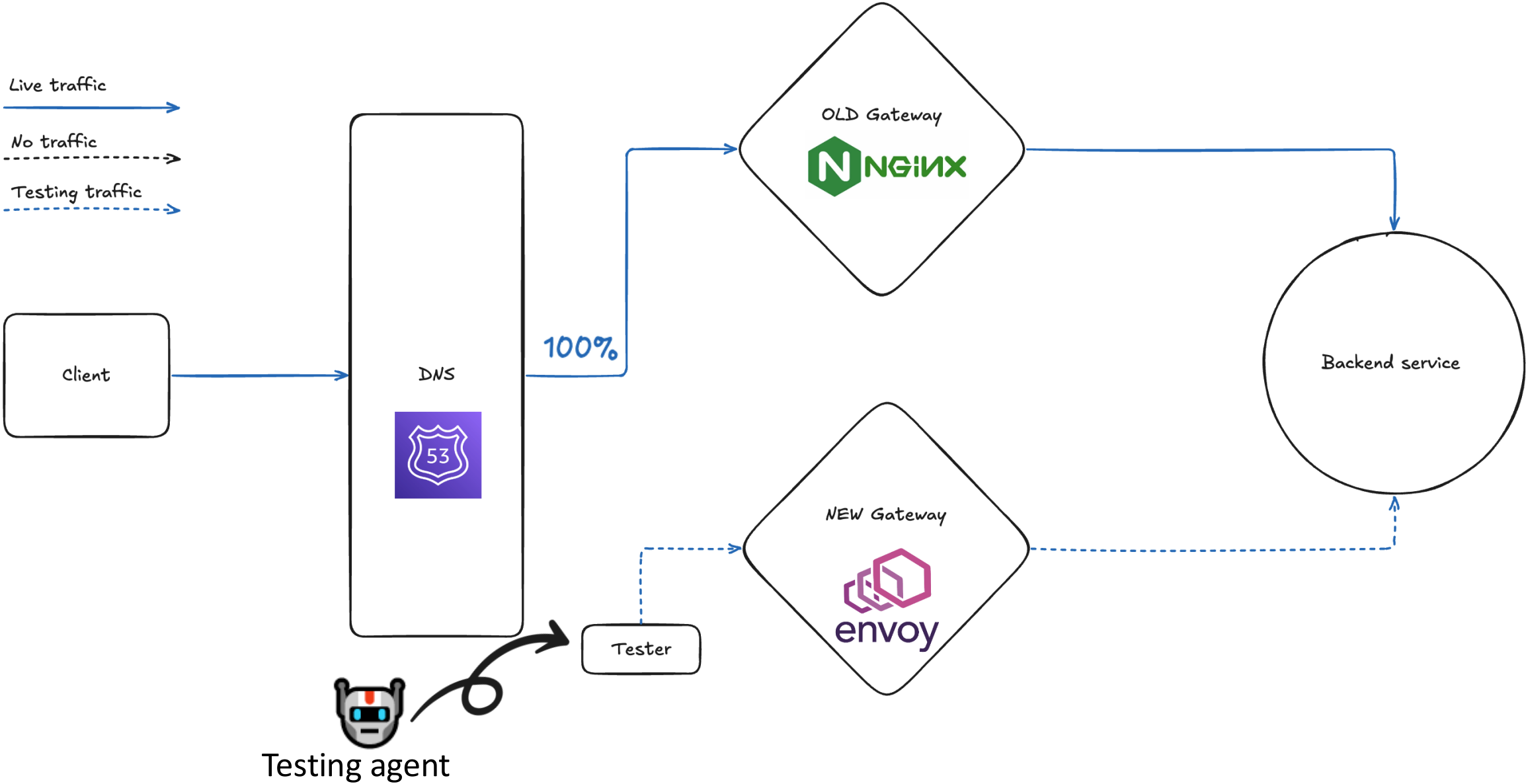
Sample Prompt

```
1 GOAL
2 ===
3 Generate shell scripts with pattern `${WORKSPACE_FOLDER}}/lta/test-<endpoint-name>-<env-name>.sh`
  that execute the curl commands contained in the files with pattern `${WORKSPACE_FOLDER}}/lta/curl-
  <endpoint-name>-<env-name>.txt`.
4
5 TASK
6 ===
7 Read each file called `${WORKSPACE_FOLDER}}/lta/curl-<endpoint-name>-<env-name>.txt`, and generate
  a shell script that executes the curl command contained in that file.
8
9 The shell command to invoke the endpoint using curl WILL BE EXACTLY like this:
10
11 ```bash
12 #!/bin/bash
13
14 [ -z "$IMS_TOKEN_EGW" ] || [ -z "$IMS_TOKEN_CGW" ] && { echo "Error: IMS_TOKENs are required"; exit
  1; }
15
16 curl -s -o /dev/null -w "%{http_code}" <REST OF THE CURL COMMAND> > "
  ${WORKSPACE_FOLDER}}/lta/result-<endpoint-name>-<env-name>.txt"
17
18 cat ${WORKSPACE_FOLDER}}/lta/result-<endpoint-name>-<env-name>.txt
19 ```
20
21 Store each shell command in a script file called `test-<endpoint-name>-<env-name>.sh`.
22
23 EXAMPLE
24 ===
25 If you have the following input file:
26 - ${WORKSPACE_FOLDER}}/lta/curl-endpoint-12-egw.txt
27
28 You'll generate the following shell scripts:
29 - ${WORKSPACE_FOLDER}}/lta/test-endpoint-12-egw.sh
30
31 VALIDATION
32 ===
33 Shell script generated MUST be valid. Use `ShellCheck` linter to validate it.
34
```

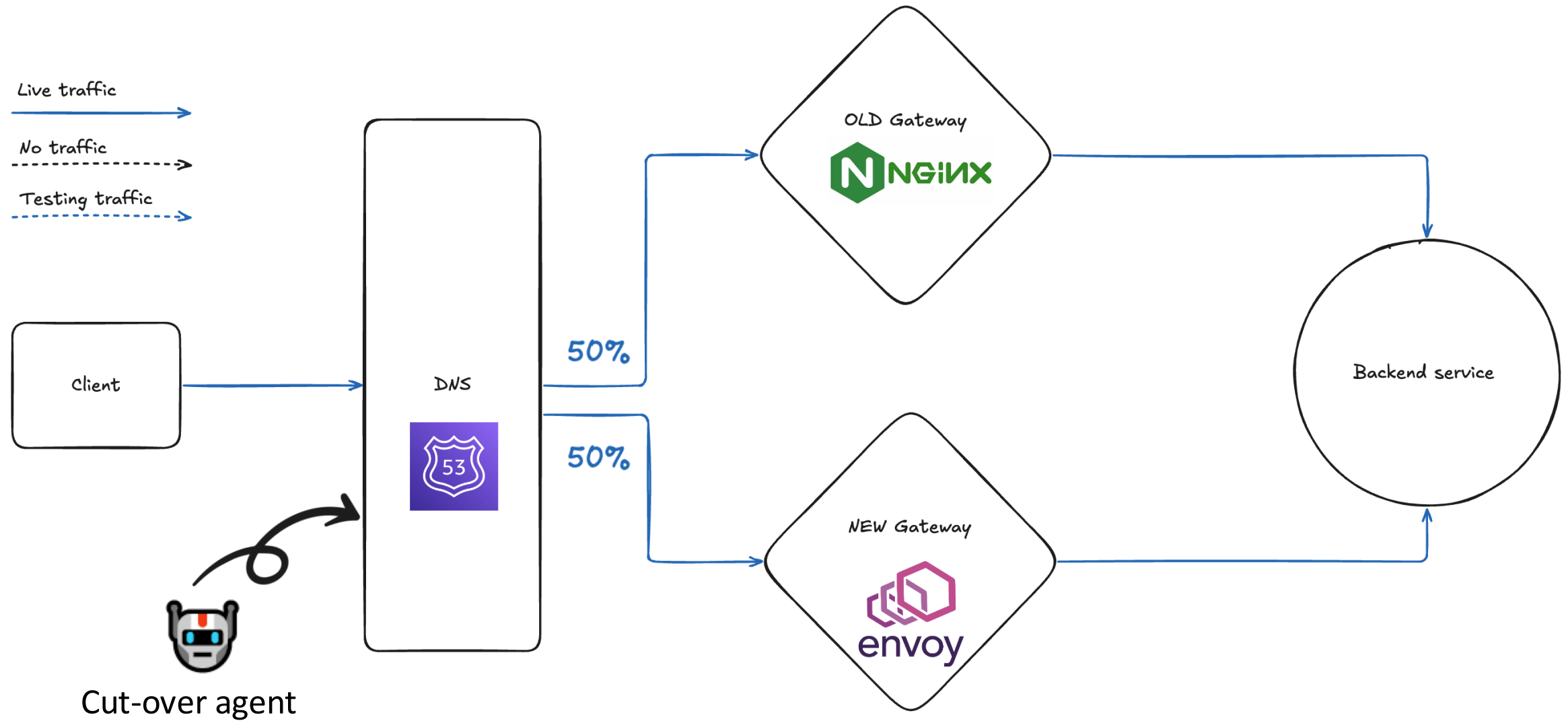
Agentic Loop for Roll-out step



Verification

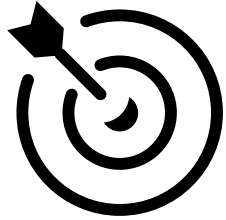


Cut-over



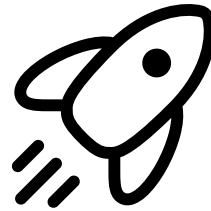
Key Take-aways

Key Take-aways



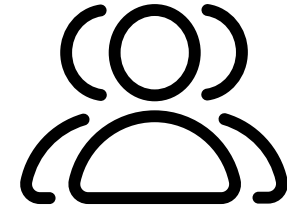
Agents are good writing code

- Write deterministic code using non-deterministic LLMs
- Don't solve the problem with LLMs
- Solve the problem with software written by LLMs



Roll-outs are time consuming

- Agents can work 24x7 to monitor and make progress on your roll-outs
- 90% of the scenarios are expected and can be handled by the agent
- 10% unexpected scenarios will invoke the human-in-the-loop



Agents do well-known tasks at scale

- An agentic system is like an army of soldiers that never stop.
- You're the captain that communicates clear commands in real-time.



Thank you!

TEMPLATE

Introduction

Welcome to the Adobe Presentation Template!

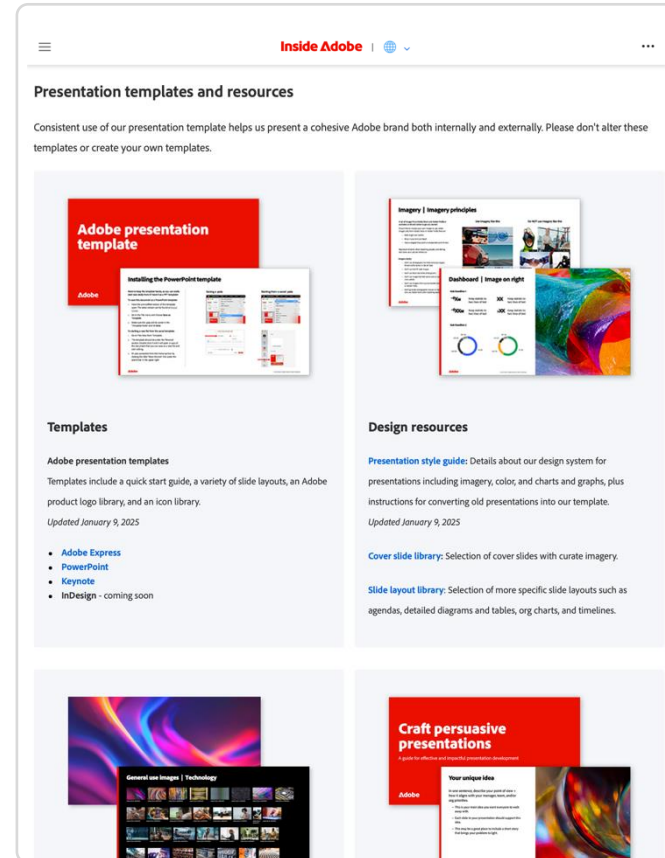
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Creating compelling presentations is a crucial skill across many roles. This guide is designed to help you harness the full potential of our corporate template to communicate your ideas with clarity and professionalism.

Whether you are gearing up for a client presentation, developing a project plan, or eager to present innovative ideas to your stakeholders, the resources and tools provided here will streamline your process and enhance your impact.

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[#adobe-presentations](#)



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This template uses weights of Adobe Clean that you may not have on your system.

The following editable text:

This is a headline for an Adobe presentation

Adobe Clean Display Black

Should look like this screenshot:

This is a headline for an Adobe presentation

 Adobe Clean Display Black

Not like any of these:

This is a headline for an Adobe presentation

 Calibri

This is a headline for an Adobe presentation

 Arial Bold (Windows)

This is a headline for an Adobe presentation

 Helvetica Bold (Mac)

If you're seeing anything other than Adobe Clean, or to ensure you have the latest set of fonts, visit Brand Center. <https://inside.corp.adobe.com/brand-center/font.html>

For additional help

Contact brand@adobe.com if you have questions about using this PowerPoint template.

Introduction

Welcome to the Adobe Presentation Template!

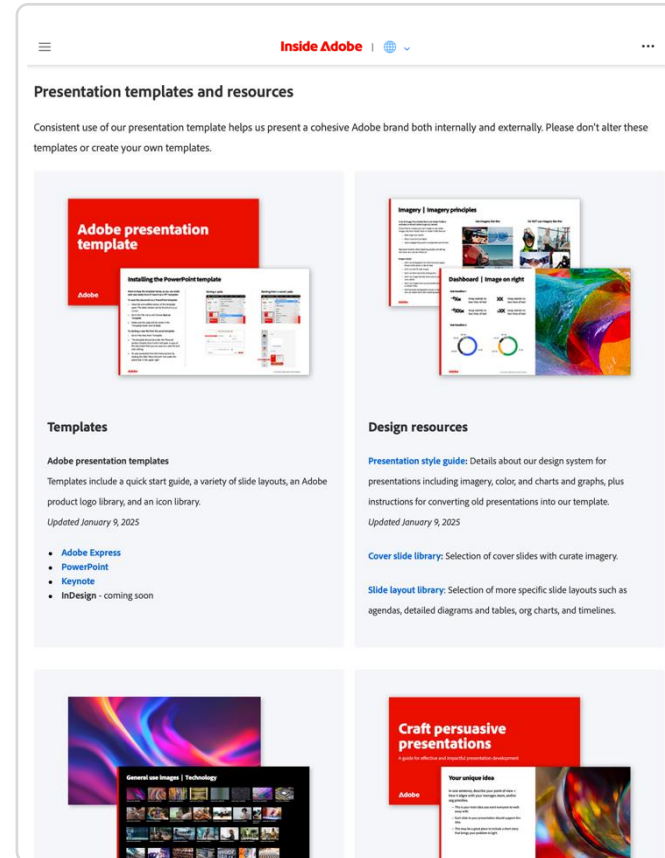
Check out [Brand Center](#) for all the latest resources and training files to help get you up and running

Also join the new [#adobe-presentations](#) channel on Slack to chat about all things presentations and keep up to date on the latest releases of templates and resources.

Creating compelling presentations is a crucial skill across many roles. This guide is designed to help you harness the full potential of our corporate template to communicate your ideas with clarity and professionalism.

Whether you are gearing up for a client presentation, developing a project plan, or eager to present innovative ideas to your stakeholders, the resources and tools provided here will streamline your process and enhance your impact.

[Brand Center](#)



[#adobe-presentations](#)



Brand at a glance



Keep it simple, clear & concise

Make sure your message is clear and can be understood quickly.



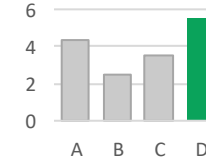
Layouts

Information laid out in a grid is easier to read. Whitespace is crucial.



Colors

Black, white, and red (#EB1000) are the corporate colors. Use bold, vibrant images to bring other color into your layouts.



Charts

Most datapoints should be shades of gray, with important ones highlighted using the extended color palette.

Aa Aa Aa

Font

Always and only use Adobe Clean. Clean Display Black is for headlines, Clean Regular is for text, Clean Bold is for bolding key terms (use sparingly).



Imagery

Use bold, optimistic, relevant, and inclusive photos.

Use images from the image library.



Icons

Only use Adobe's icon set.

Icons are only black or white, never colored



Use product logos

Use the official product logos to represent our products and spell the name out next to it in editable text. Don't use lockups with baked-in text.



Don't alter our corporate marks

Don't recolor or otherwise alter the any Adobe marks.



Don't alter the red thread

The red stripe (thread) on the left side is an important brand element, not to be recolored, overlapped, or altered in any way.

Installing the PowerPoint template

Want to keep the template handy, so you can easily start new decks from it? Save it as a PPT template!

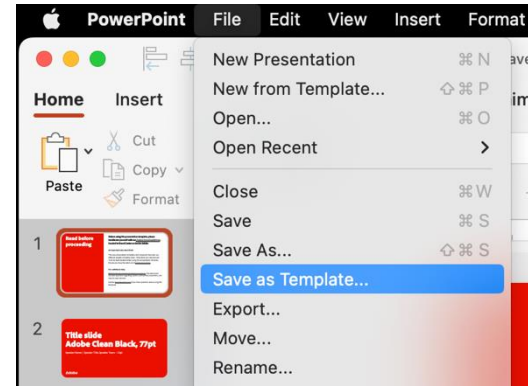
To save this document as a PowerPoint template:

1. Have the unmodified version of this template open. The latest version can be found on [Brand Center](#).
2. Go to the File menu and choose **Save as Template**.
3. Make sure the .potx will be saved in the Templates folder and hit **Save**.

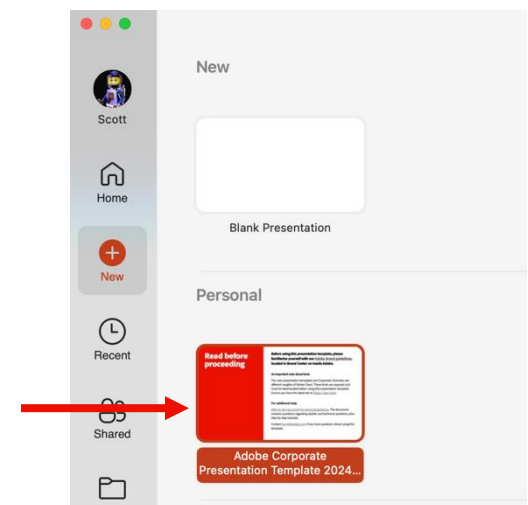
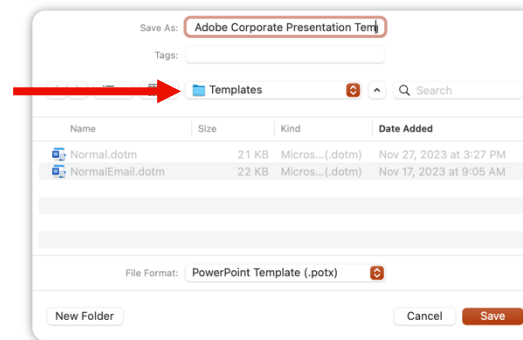
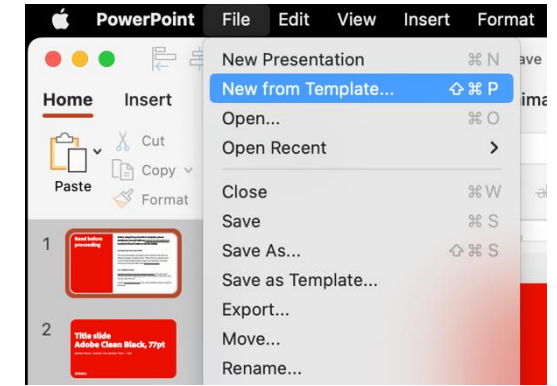
To starting a new file from the saved template:

1. Go to File>New from Template...
2. The template should be under the Personal section. Double click it and it will open a copy of this document that you can save as a new file and start editing.
3. It's also accessible from the Home section by clicking the little "More themes" link under the search bar in the upper right.

Saving a .potx



Starting from a saved .potx



Title slide

Adobe Clean Display Black, 77pt

Speaker Name | Speaker Title, Speaker Team – 24pt

Adobe

Title slide | Light Adobe Clean Display Black, 77pt

Speaker Name | Speaker Title, Speaker Team – 24pt



Title slide

Image right

Speaker Name – 24pt

Speaker Title, Speaker Team – 24pt

Adobe



Image placeholder

Delete to add your own image.

Title slide | Dark Adobe Clean Display Black, 77pt

Speaker Name | Speaker Title, Speaker Team – 24pt



Title slide

Image right

dark

Speaker Name – 24pt

Speaker Title, Speaker Team – 24pt

Adobe



Image placeholder

Delete to add your own image.

A solid red vertical bar is positioned on the far left side of the image, extending from the top to the bottom.

Section divider | Light

Section divider | Dark

Title and content

- Bullet 1 – Adobe Clean, 20pt
 - Bullet 2 – Adobe Clean, 14pt
 - Bullet 3 – Adobe Clean, 12pt

Agenda

Speaker Name	Section	Time
John Reese	Analyzing Data in the Field	9:00a-9:30a
Joss Carter	Governance and Regulations	9:30a-10:00a
Harold Finch	Data Aggregation via Alt Sources	10:00a-11:30a
Break		11:30a-12:30p
Carl Elias	Networking and Organization	12:30p-2:00p
Zoe Morgan	Customer Loyalty	2:00p-4:00p

“Remove bullet from quote itself.”

- Attribution is a second level bullet

Image on right 1/2



Image placeholder

Delete to add your own image.

Image on right 1/3



Image placeholder

Delete to add your own image.

Title and content | Dark

- Bullet 1 – Adobe Clean, 20pt
 - Bullet 2 – Adobe Clean, 14pt
 - Bullet 3 – Adobe Clean, 12pt
- Keep text to a minimum on a black background

“Remove bullet from quote itself.”

- Attribution is a second level bullet

Image on right 1/2 | Dark



Image placeholder

Delete to add your own image.

Image on right 1/3 | Dark



Image placeholder

Delete to add your own image.

A solid red vertical bar is positioned on the far left side of the image, extending from the top to the bottom.

Buckets | Light

Title and content, 2 columns (text)

- Bullet 1

- Bullet 2

- Bullet 3

- Bullet 1

- Bullet 2

- Bullet 3

Title and content, 3 columns (text)

- Bullet 1
 - Bullet 2
 - Bullet 3

- Bullet 1
 - Bullet 2
 - Bullet 3

- Bullet 1
 - Bullet 2
 - Bullet 3

Title and content, 4 columns (text)

- Bullet 1

- Bullet 2

- Bullet 3

- Bullet 1

- Bullet 2

- Bullet 3

- Bullet 1

- Bullet 2

- Bullet 3

- Bullet 1

- Bullet 2

- Bullet 3

Title and content, 5 columns (text)

- | | | | | |
|--|--|--|--|--|
| <ul style="list-style-type: none">▪ Bullet 1<ul style="list-style-type: none">▪ Bullet 2<ul style="list-style-type: none">▪ Bullet 3 | <ul style="list-style-type: none">▪ Bullet 1<ul style="list-style-type: none">▪ Bullet 2<ul style="list-style-type: none">▪ Bullet 3 | <ul style="list-style-type: none">▪ Bullet 1<ul style="list-style-type: none">▪ Bullet 2<ul style="list-style-type: none">▪ Bullet 3 | <ul style="list-style-type: none">▪ Bullet 1<ul style="list-style-type: none">▪ Bullet 2<ul style="list-style-type: none">▪ Bullet 3 | <ul style="list-style-type: none">▪ Bullet 1<ul style="list-style-type: none">▪ Bullet 2<ul style="list-style-type: none">▪ Bullet 3 |
|--|--|--|--|--|

Title and content, 2 columns (text + images)

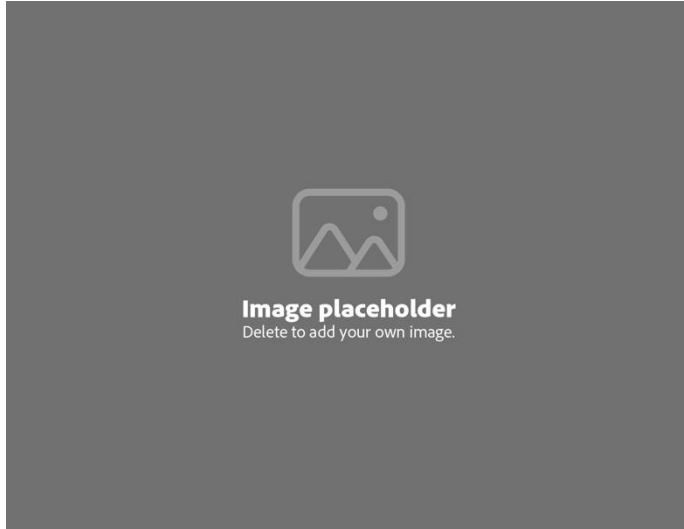


- Bullet 1
 - Bullet 2
 - Bullet 3



- Bullet 1
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 - Bullet 3

Title and content, 3 columns (text + images)



- Bullet 1
 - Bullet 2
 - Bullet 3



- Bullet 1
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 - Bullet 3



- Bullet 1
 - Bullet 2
 - Bullet 3

Title and content, 4 columns (text + images)



- Bullet 1
 - Bullet 2
 - Bullet 3



- Bullet 1
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- Bullet 1
 - Bullet 2
 - Bullet 3



- Bullet 1
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 - Bullet 3

Title and content, 5 columns (text + images)



- Bullet 1
 - Bullet 2
 - Bullet 3

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- Bullet 1
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 - Bullet 3

Title and content, 2 columns (image + title)

Column 1 title



Image placeholder
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Column 2 title



Image placeholder
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Title and content, 3 columns (image + title)

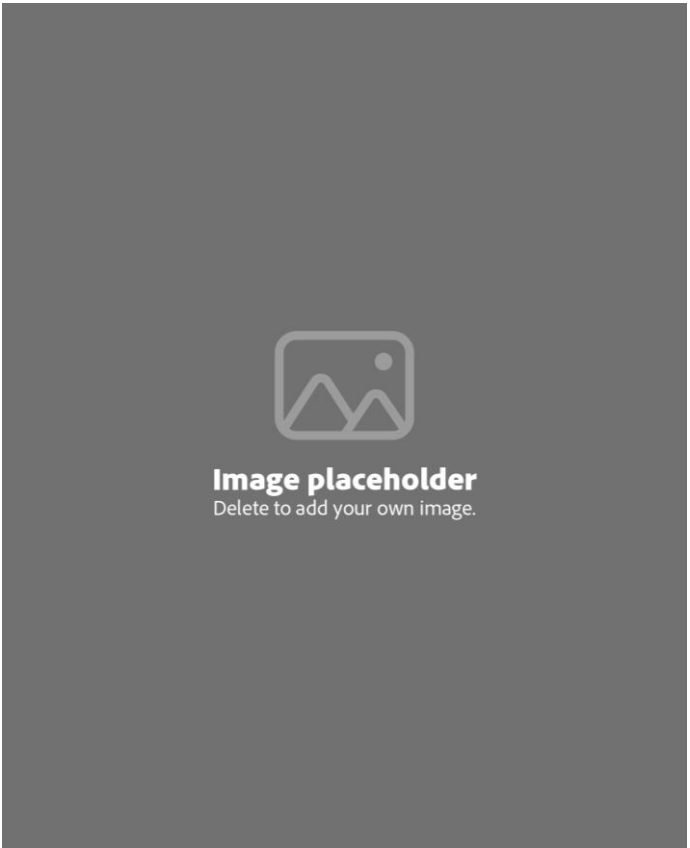
Column 1 title



Column 2 title



Column 3 title



Title and content, 4 columns (image + title)

Column 1 title

Column 2 title

Column 3 title

Column 4 title



Image placeholder
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Image placeholder
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Image placeholder
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Title and content, 5 columns (image + title)

Column 1 title

Column 2 title

Column 3 title

Column 4 title

Column 5 title



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Buckets | Dark

Title and content, 2 columns (text) | Dark

- Bullet 1

- Bullet 2
 - Bullet 3

- Keep text to a minimum on a black background

- Bullet 1

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 - Bullet 3

Title and content, 3 columns (text) | dark

- Bullet 1
 - Bullet 2
 - Bullet 3
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 - Bullet 2
 - Bullet 3
- Bullet 1
 - Bullet 2
 - Bullet 3
- Keep text to a minimum on a black background

Title and content, 4 columns (text) | dark

- Bullet 1
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 - Bullet 3
- Bullet 1
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 - Bullet 3
- Keep text to a minimum on a black background

Title and content, 5 columns (text) | dark

- Bullet 1
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 - Bullet 3
- Keep text to a minimum on a black background

Title and content, 2 columns (text + images) | Dark



Image placeholder

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- Bullet 1
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Title and content, 3 columns (text + images) | Dark



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Column 3 title



Image placeholder
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Title and content, 4 columns (image + title) | Dark

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Column 3 title



Image placeholder
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Column 4 title



Image placeholder
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Title and content, 5 columns (image + title) | Dark

Column 1 title



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Column 2 title



Image placeholder
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Column 3 title



Image placeholder
Delete to add your own image.

Column 4 title



Image placeholder
Delete to add your own image.

Column 5 title



Image placeholder
Delete to add your own image.

Image grids

1 x 1 image only



Image placeholder
Delete to add your own image.

2 x 2 images only



Image placeholder
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Image placeholder
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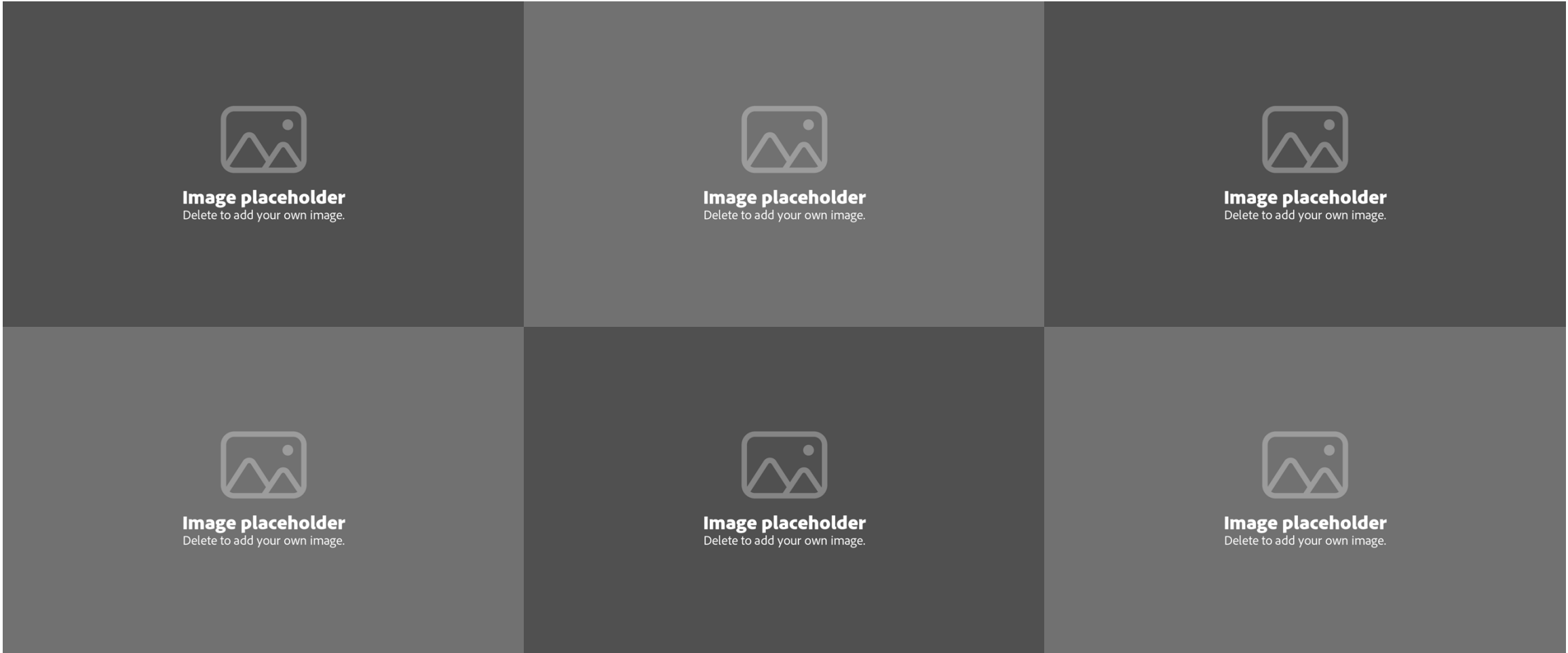


Image placeholder
Delete to add your own image.



Image placeholder
Delete to add your own image.

3 x 2 images only



8 x 4 images only



1 x 1 image only – dark



Image placeholder
Delete to add your own image.

2 x 2 images only – dark



Image placeholder
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Image placeholder
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Image placeholder
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Image placeholder
Delete to add your own image.

3 x 2 images only – dark



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Image placeholder
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Image placeholder
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Image placeholder
Delete to add your own image.

8 x 4 images only | Dark





Image placeholder

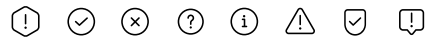
Delete to add your own image.

A solid red vertical bar runs along the left edge of the slide.

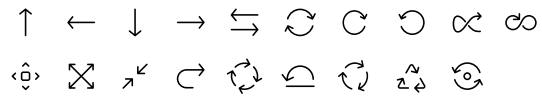
Icons

Dark icons for white backgrounds

Alerts & actions



Arrows



Art & media



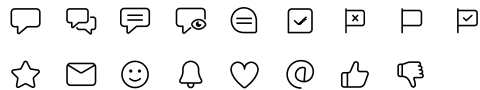
Charts & dataviz



Commerce



Communications



Concepts



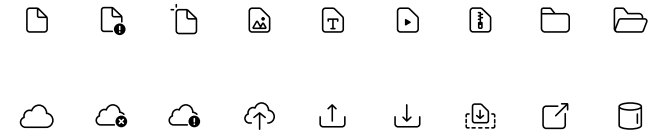
Cursors & UI



Devices



Files & Cloud



Generative



Location & time



Users



Web



Light icons for dark backgrounds

Alerts & actions	       
Arrows	                   
Art & media	                                      
Charts & dataviz	                         
Commerce	           
Communications	               
Concepts	                                   

Cursors & UI	   
Devices	    
Files & Cloud	                 
Generative	   
Location & time	       
Users	   
Web	     

Cloud



Adobe Creative Cloud



Adobe Document Cloud



Adobe Experience Cloud

Applications and platforms



Adobe Express



Adobe Firefly



Adobe Photoshop



Adobe Photoshop Express



Adobe Lightroom



Adobe Lightroom Classic



Adobe Fresco



Adobe Premiere



Adobe After Effects



Adobe Audition



Adobe Animate



Adobe Character Animator



Adobe Media Encoder



Frame.io



Adobe Illustrator



Adobe InDesign



Adobe InDesign Server



Adobe InCopy



Adobe Dreamweaver



Adobe XD



Adobe Substance 3D



Adobe Substance 3D Modeler



Adobe Substance 3D Sampler



Adobe Substance 3D Designer



Adobe Substance 3D Painter



Adobe Substance 3D Stager



Adobe Substance 3D Assets



Adobe Substance Reviewer



Adobe Dimension



Adobe Community Assets



Adobe Stock



Behance



Adobe Bridge



Adobe Capture



Adobe Portfolio



Adobe Fonts



Adobe Content Authenticity



Adobe Acrobat Reader/Standard/Pro



Adobe Acrobat Classic



Adobe Acrobat Sign



Adobe Scan



Adobe Acrobat Diagnostics



Content, commerce, and workflows

Adobe Experience Manager

Adobe Commerce

Adobe Workfront

Adobe GenStudio for Performance Marketing

Customer journeys

Adobe Journey Optimizer

Adobe Marketo Engage

Adobe Target

Adobe Campaign

Data insights and audiences

Adobe Analytics

Adobe Customer Journey Analytics

Adobe Real-Time CDP

Adobe Mix Modeler



Adobe Experience Platform



Adobe Workfront

Adobe