



LIG102

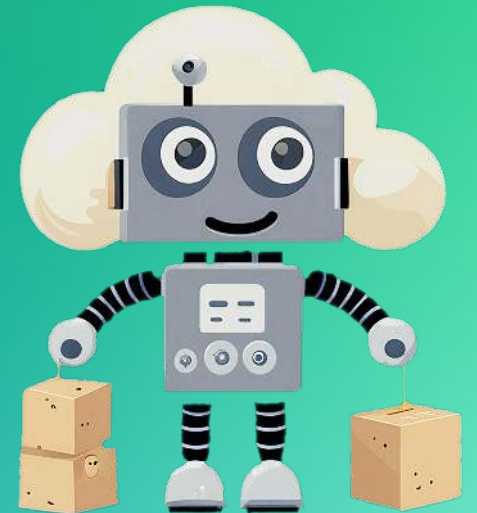
Automating Fitness Video Analysis

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AWS Generative AI Innovation Delivery



With Generative AI, we can
understand videos on a whole new
level and automate the process of
searching and augmenting videos

Why Does That Matter?



Online Fitness Video Trend



Use Case 1: Search

How can you find and select
the right workout?



How can we go from here...?

yoga workout

yoga workout for weight loss

yoga workout at home

yoga workout boho beautiful

yoga workout for beginners

yoga workout mady morrison

yoga workout 10 minutes

yoga workout 15 minutes

yoga workout 30 minutes

yoga workout move with nicole

yoga workout 20 min

yoga workout full body

yoga workout boho

yoga workout men

...to meaningful selection criteria?

- I did X yesterday, which one today?
- Could I skip a section to save time?
- Can I follow this without a screen?
- Can I do this with my injury?
- What is the vibe of the class/ instructor?

Generative AI Opportunities

New meta data to
**characterize the
workout**

Information on **class
structure, intensity
and focus**

Class highlights

Use Case 2: Guidance



What does it take a to motivate
and guide someone behind the
screen who is by themselves?

How does equipment know
when to adjust resistance?

Without Moderation...



Voice and Video Analysis Opportunities:

Display guiding
**parameters and
transitions**

Reference
elements of **class
structure**

With Moderation...

Next exercise: Push-Up



Alternative Exercise:
Plank

Time remaining:
10 sec

What is Intensity Tracking?

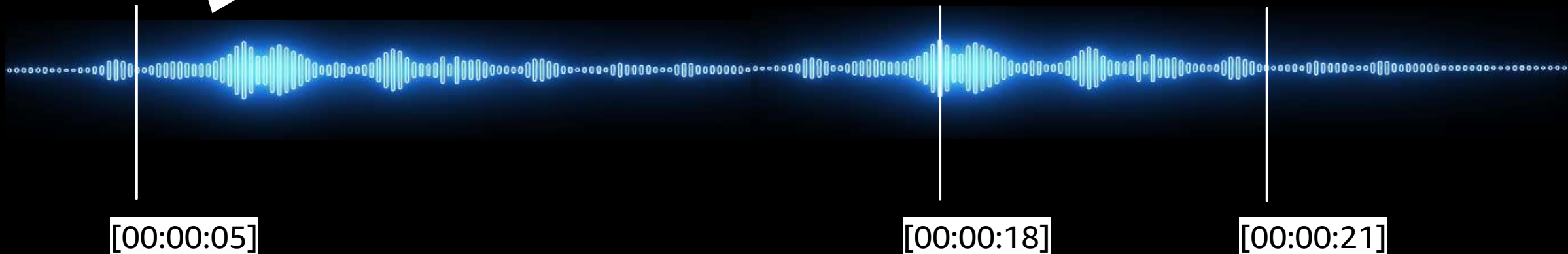
How does your
bike know when
to transition to
another
resistance?



Good morning everyone and welcome to today's 30-minute power ride! I'm Coach Emma and I'll be guiding you through an amazing workout today.

Let's start with a quick warm-up.
Keep your resistance at level 3

and maintain a comfortable cadence around 70 RPM.



Intensity Tracking: How Did We Build It?

High-Level Architecture



Video

High-Level Architecture



Video



Amazon Transcribe

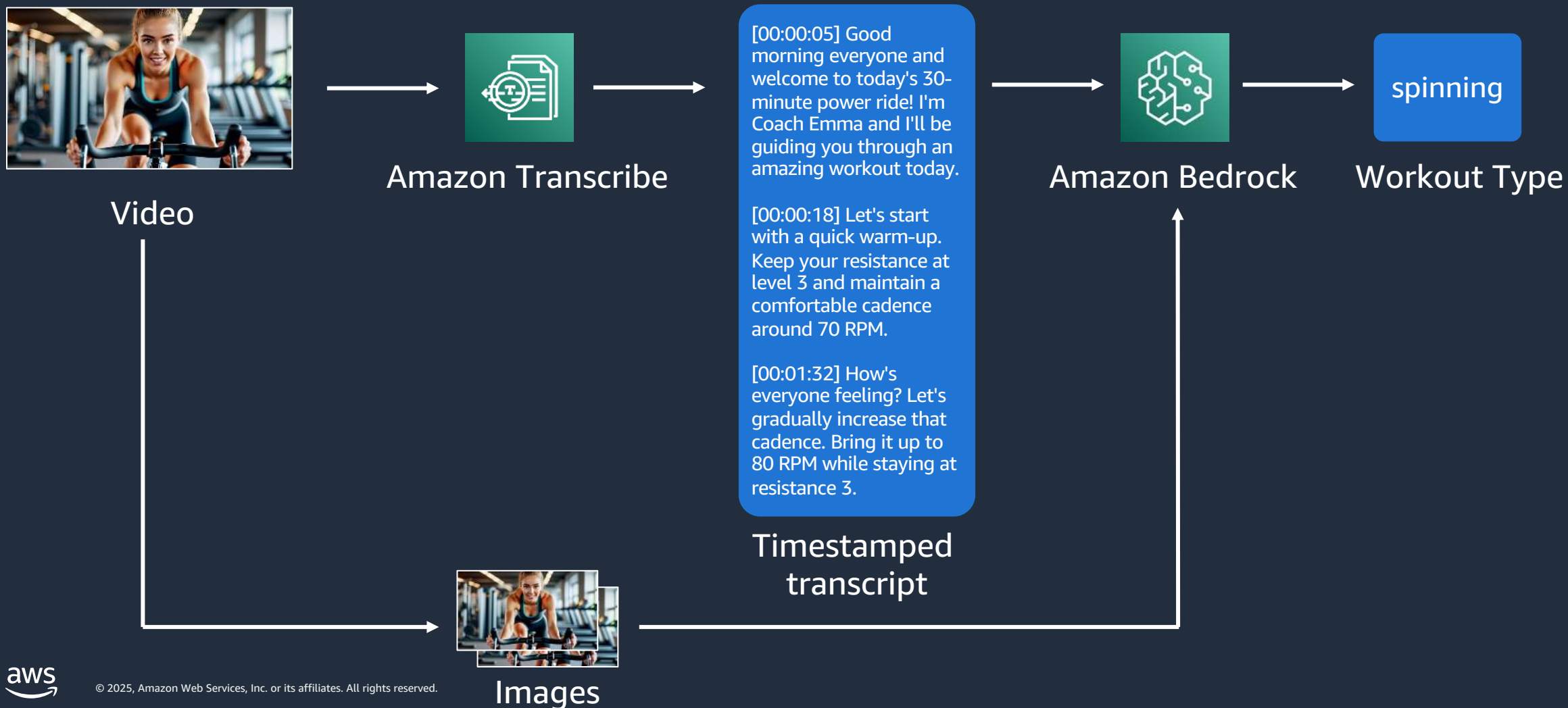
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[00:00:18] Let's start with a quick warm-up. Keep your resistance at level 3 and maintain a comfortable cadence around 70 RPM.

[00:01:32] How's everyone feeling? Let's gradually increase that cadence. Bring it up to 80 RPM while staying at resistance 3.

Timestamped transcript

High-Level Architecture



High-Level Architecture



Video



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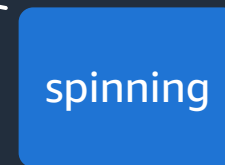
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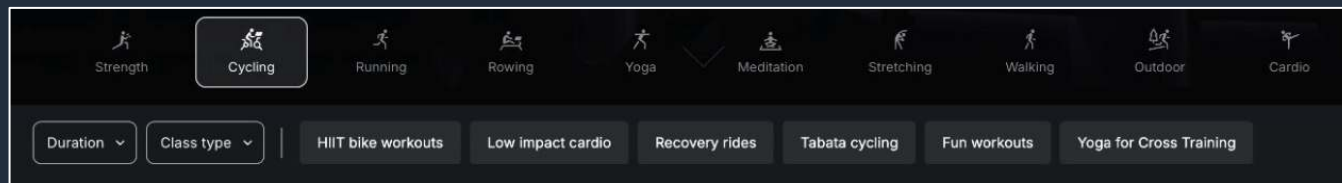
Amazon Bedrock



Workout Type

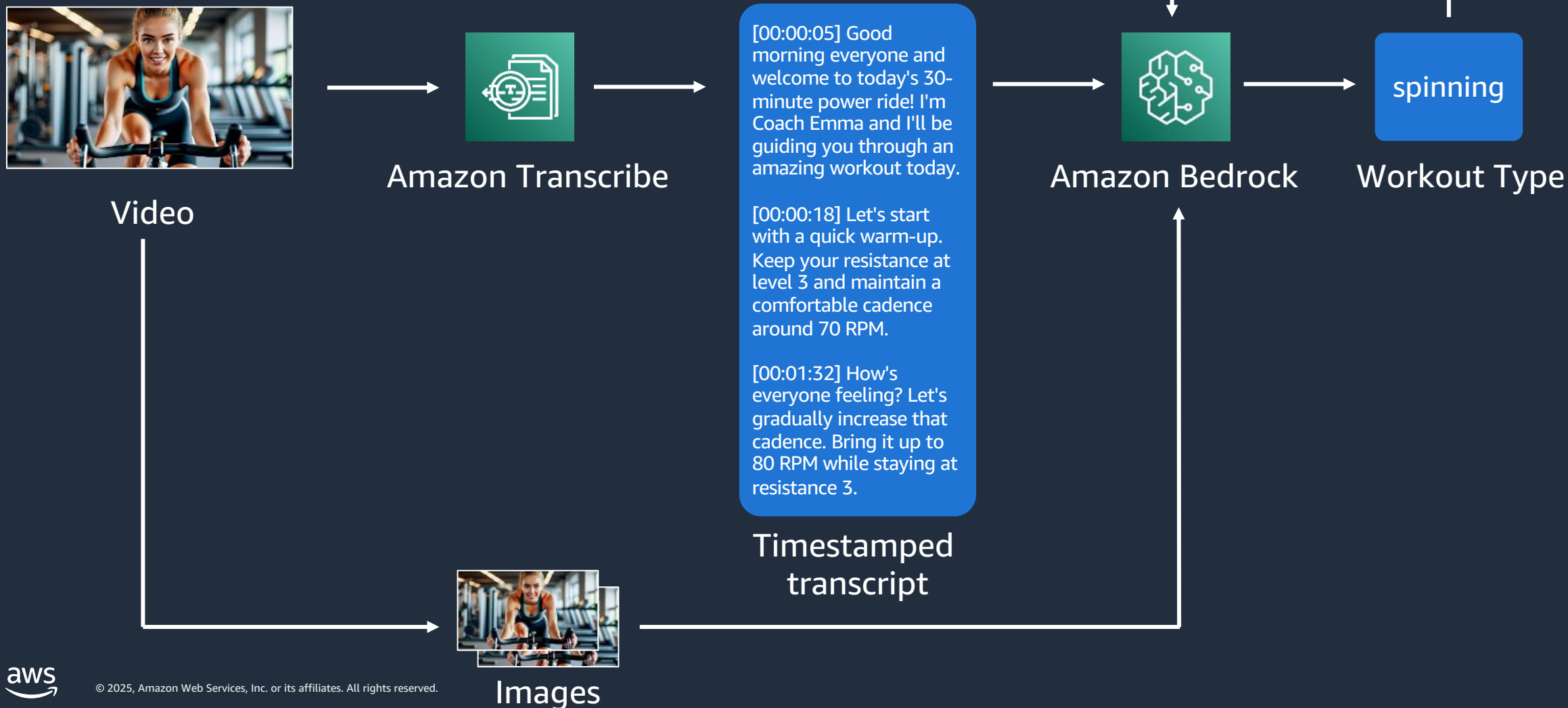


Images

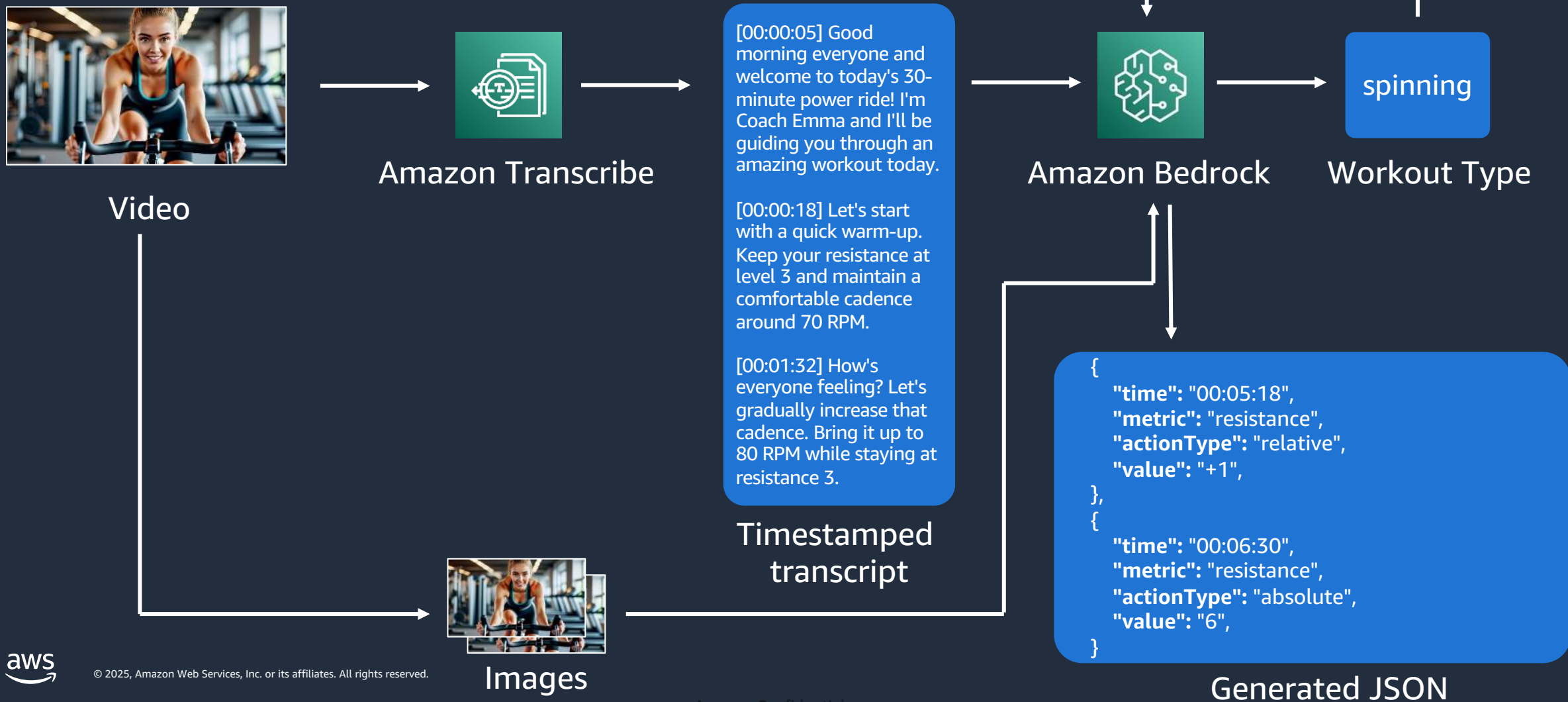


Meta-Data for Search and Selection

High-Level Architecture



High-Level Architecture



The Hard Parts



Challenge #1: Adapting to Different Coaches

Clear command

“Alright team, we're hitting our first hill climb! Turn that resistance knob to the right until you reach level 7”

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Different levels

“If you were at a comfortable 6 out of 10 before, I want you to push to what feels like an 8 out of 10 effort. Your breathing should be heavy but controlled”

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Clear command

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Delayed instruction

"In 30 seconds, when that chorus hits, we're all going to increase our resistance by 2 full turns and stand up out of the saddle."

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Ambiguous effort

"Go all in!"

Convert to numbers

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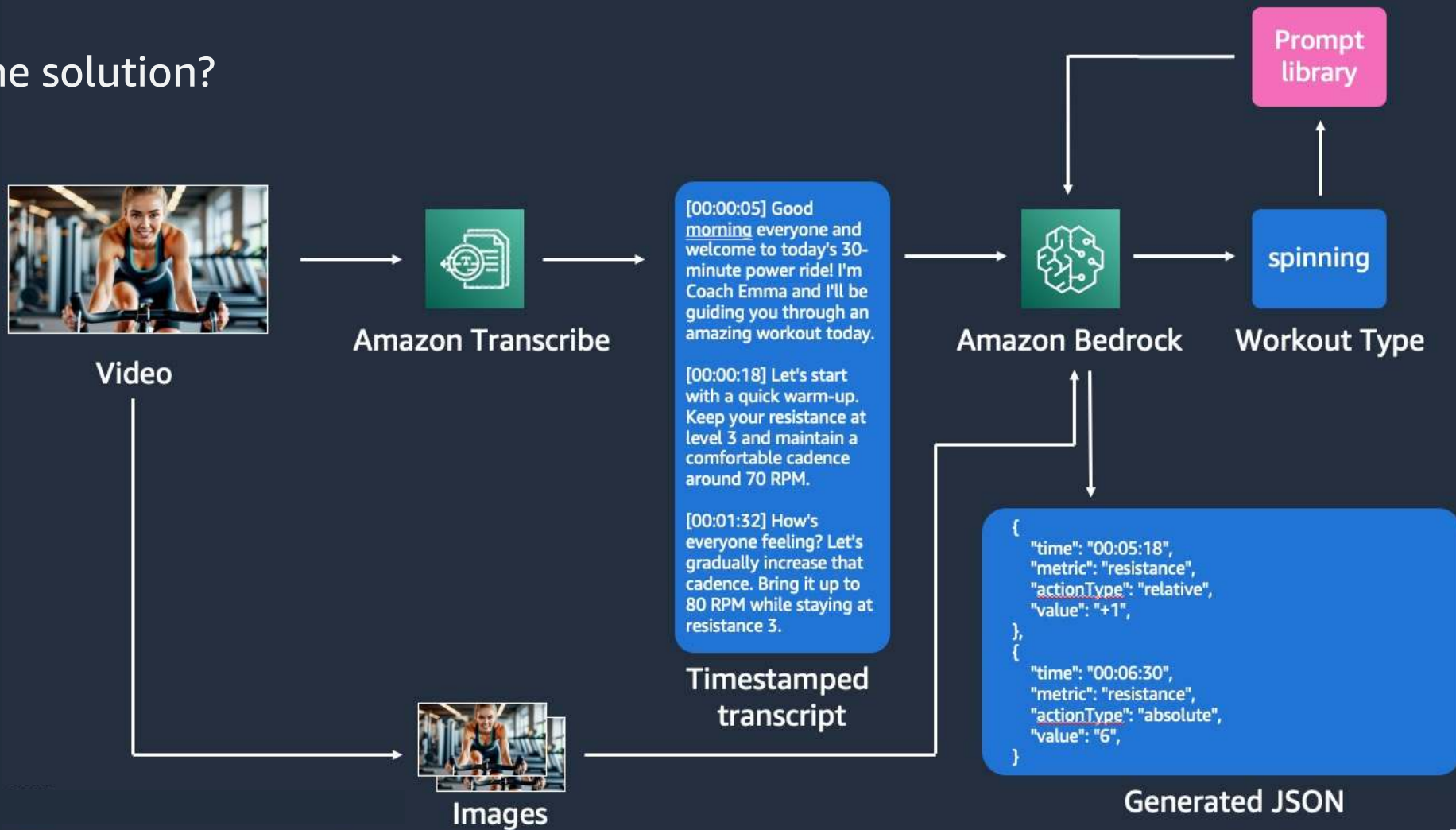
"Go all in!"

Library of
examples

=> Dynamically load examples from the same **modality**, **workout type**, and **coach**

Challenge #2: Evaluation

How to evaluate the solution?



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Transcription accuracy

- Word error rate
- Timestamp accuracy

Truth

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Transcript

[00:00:05] Good morning everyone and welcome to today's 30-minute power ride! I'm Coach Anna and I'll be guiding you through an amazing workout today.

[00:00:18] Let's start with a quick warm-up. Keep your resistance at level 3 and maintain a comfortable cadence around 17RPM.



Comparing true and extracted transcripts

Challenge #2: Evaluation

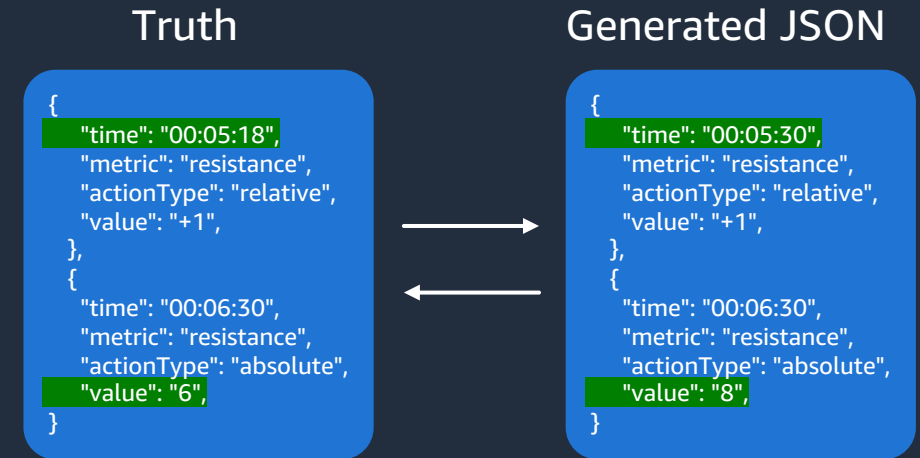
How to evaluate the solution?

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Metrics extraction accuracy

- Metric identification (e.g., resistance vs speed)
- Time of action (e.g., time between the real and identified action)
- Adjustment value (e.g., difference between the actual and true value)



Comparing true and generated JSONs

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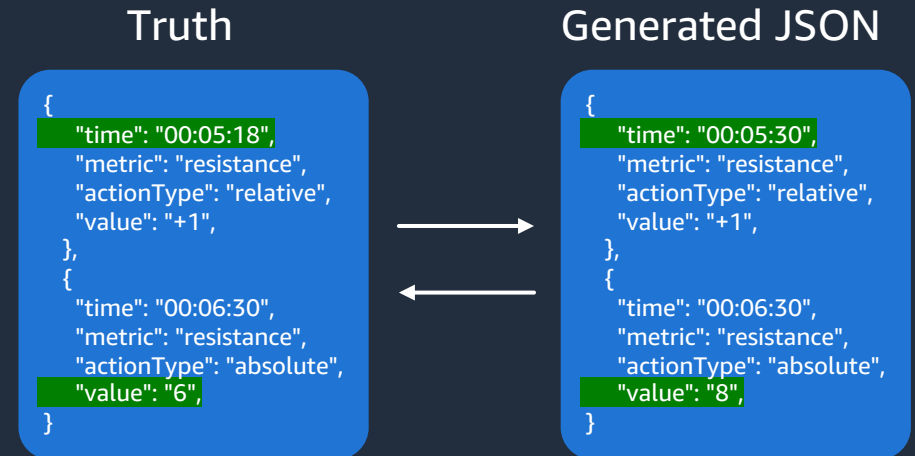
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Comparing true and generated JSONs

Requires manual human annotation of fitness videos

Challenge #3: Processing in Near Real-Time

- Full transcript is not available in real-time
- Hence, solution should work with batches

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[00:02:45] Perfect work! Now we're going to add a little more challenge. I want you to increase your resistance to level 5. Keep that same cadence at 80 RPM.

[00:03:50] We're about to hit our first hill climb. In 10 seconds, we'll be turning up that resistance dial.

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- How big should be the batch size?
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- How much context to add?
 - Include the full session before
 - Use a sliding window approach

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Outlook



Outlook

Instructor Monitoring

- Movement Classification
- Understanding targeted muscle groups

Athlete Monitoring

- Pose Estimation and Biomechanics Analysis
- Repetition & Set Detection
- Real-Time Feedback Generation

Custom Classes and Recommendations





Thank you!

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Please complete the session survey.









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