
AWS
re:Invent
NOV. 28 – DEC. 2, 2022 | LAS VEGAS, NV

FWM315

Create real-time, event-driven apps with Amazon EventBridge & AWS AppSync

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AWS

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Agenda

GraphQL overview

AWS AppSync overview

Real-time scenarios

Filtering and Invalidation

Event-driven apps

Demo

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GraphQL is a **query language** for APIs and a **runtime** for fulfilling those queries with your **existing data**



Describe your data

```
type Project {
  name: String
  tagline: String
  contributors: [User]
}
```

Ask for what you want

```
{
  project(name: "GraphQL") {
    tagline
  }
}
```

Get predictable results

```
{
  "project": {
    "tagline": "A query language for APIs"
  }
}
```

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A query language for APIs

Queries

```
query GetPost {
  getPost(id: "1") {
    id
    title
    author
    date
  }
}
```

Mutations

```
mutation CreatePost {
  createPost(input: {…}) {
    id
    title
    author
    date
  }
}
```

Subscriptions

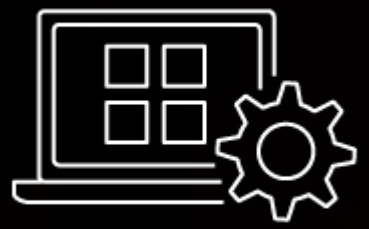
```
subscription OnCreatePost {
  onCreatePost {
    id
    title
    author
    date
  }
}
```

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AWS AppSync overview

ACCELERATE APPLICATION DEVELOPMENT AND IMPROVE PERFORMANCE WITH GRAPHQL AND PUB/SUB API SERVICE



Build applications faster

Frontend developers can build features without waiting for backend teams to create new APIs



Simplified data access

Interact with data from multiple microservices, data sources, and REST APIs using a single API



Improve application performance

Fetch only required data and reduce the number of network requests to fetch data for a particular view



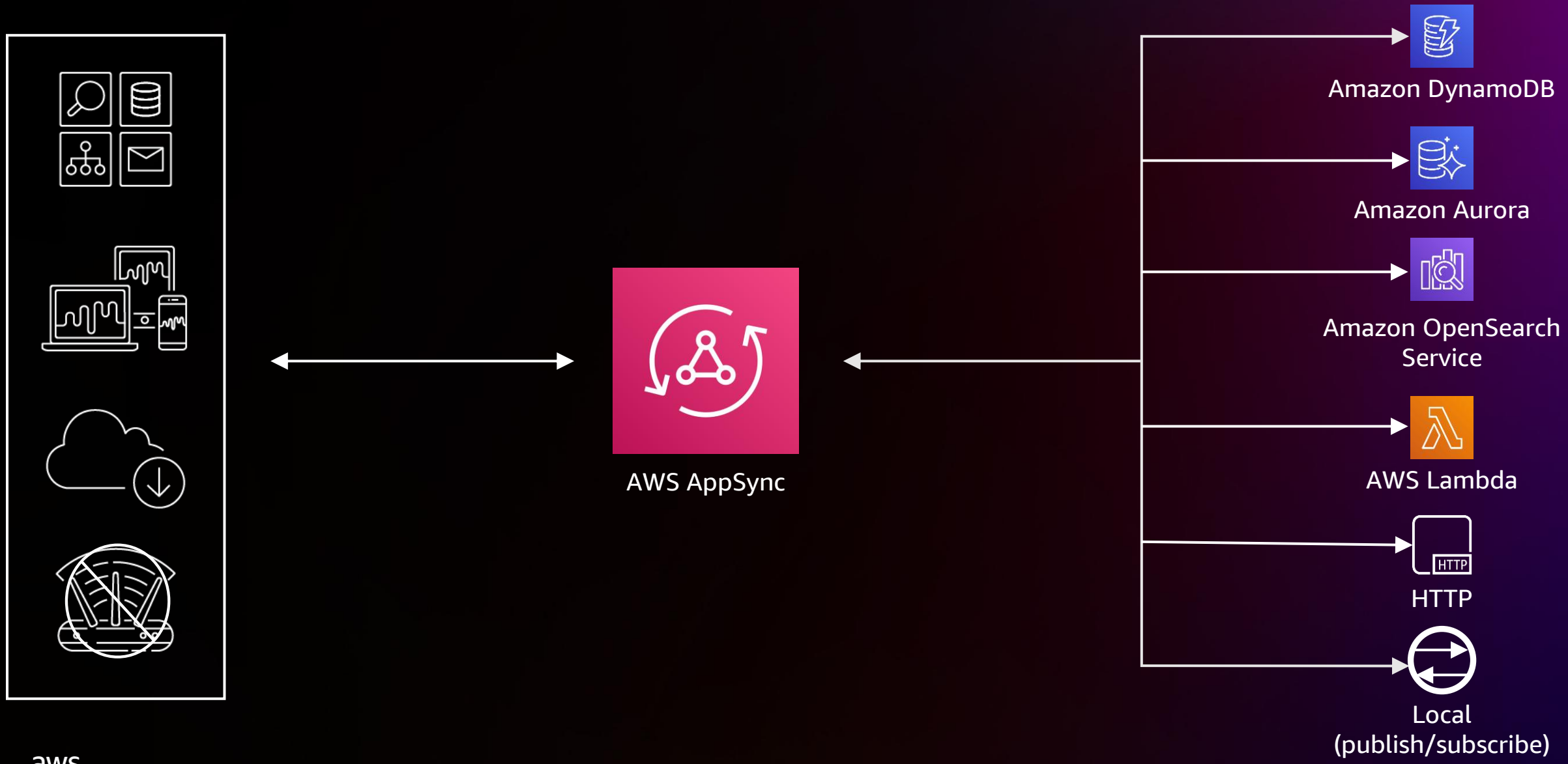
Real-time experiences

Create engaging applications with real-time subscriptions

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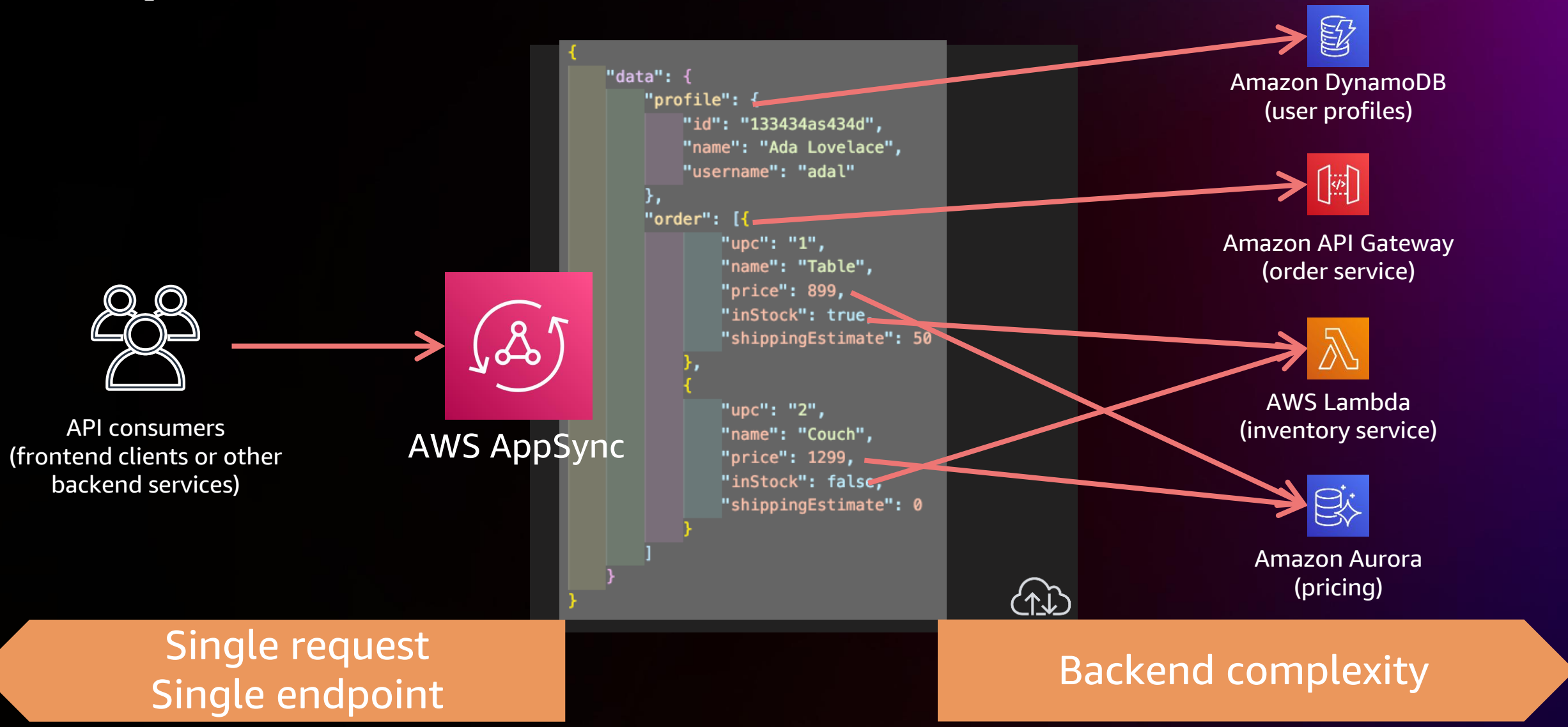
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How AWS AppSync works



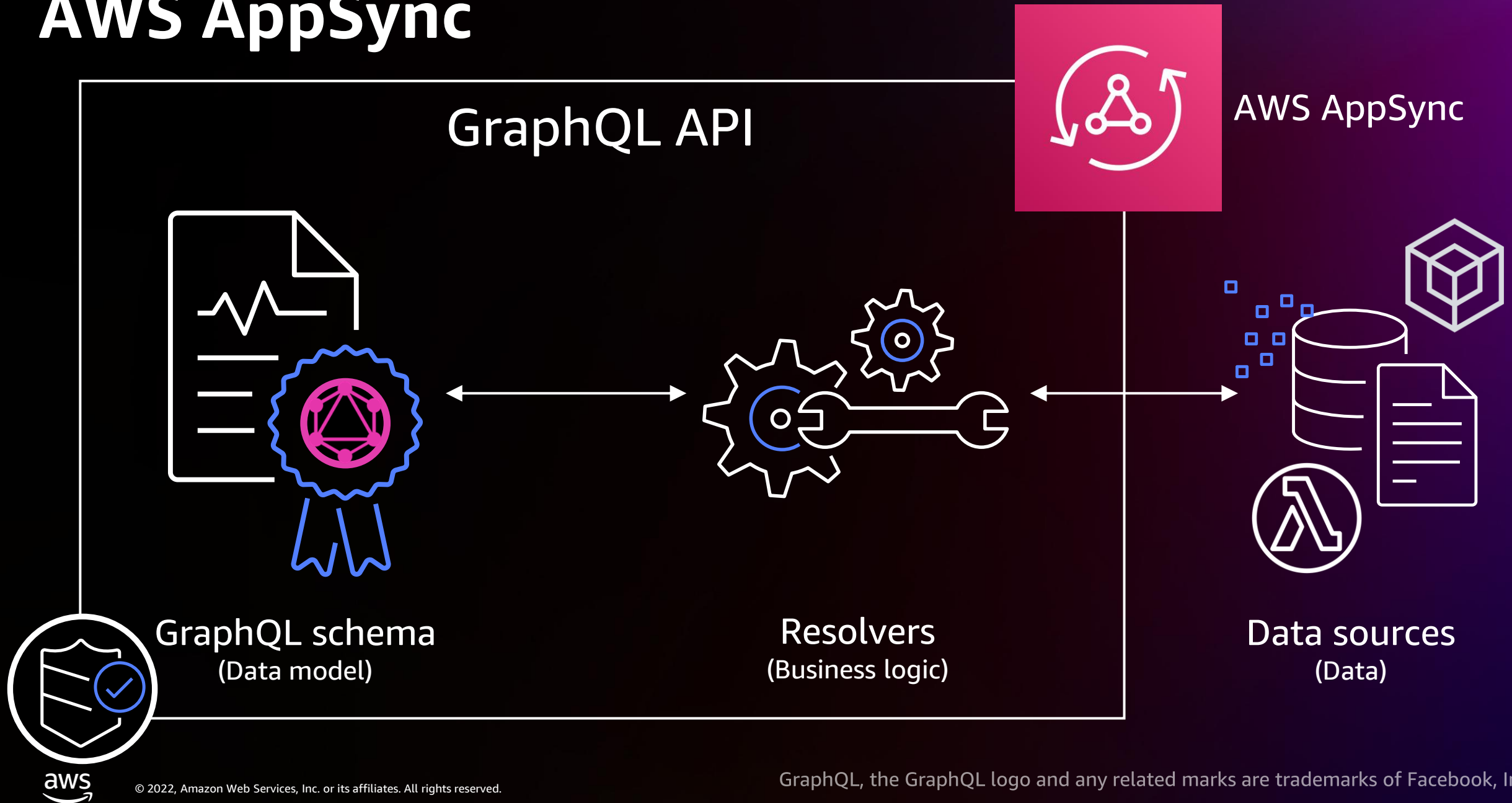
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Simplified data access



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AWS AppSync

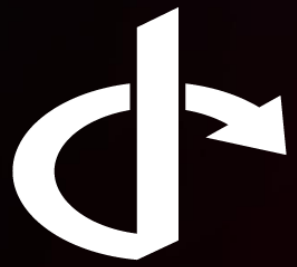


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Security



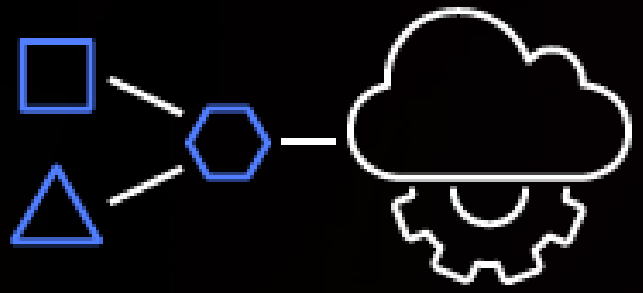




API keys	Amazon Cognito user pools	OpenID Connect	AWS Identity and Access Management (IAM)	AWS Lambda

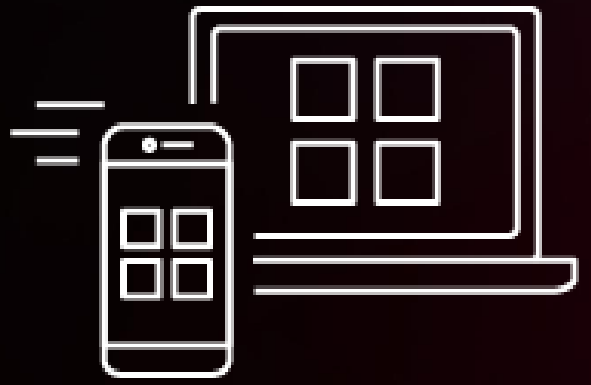
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What are customers building with AppSync?



Universal APIs

- Enterprise data
- Apps connect to many data sources and microservices



Real-time applications

- Chat functionality
- Fan engagement
- Location-aware notifications



Offline applications

- Consumer
- IoT/connected
- Field service
- Offline support

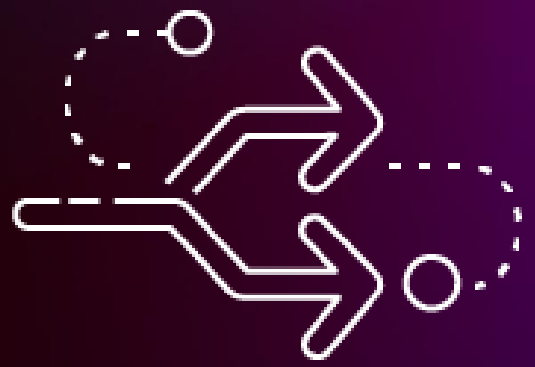
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Real-time

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Real-time apps

- Sending data (Publishing) – User, event, backend
- Receiving data (Subscribing)
- As it happens
- Push, not polling
- Milliseconds, not seconds
- 1:1, 1:many, and many:many





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Real-time use cases

- Collaboration
- Dashboards
- Leaderboards
- Media and entertainment
- Healthcare
- Live streaming
- Sports
- Geolocation
- Chat and messaging
- Gaming
- Audience interaction
- Social media
- E-learning
- Automation
- Internet of Things (IoT)
- Smart homes
- Trading and fintech
- Ecommerce

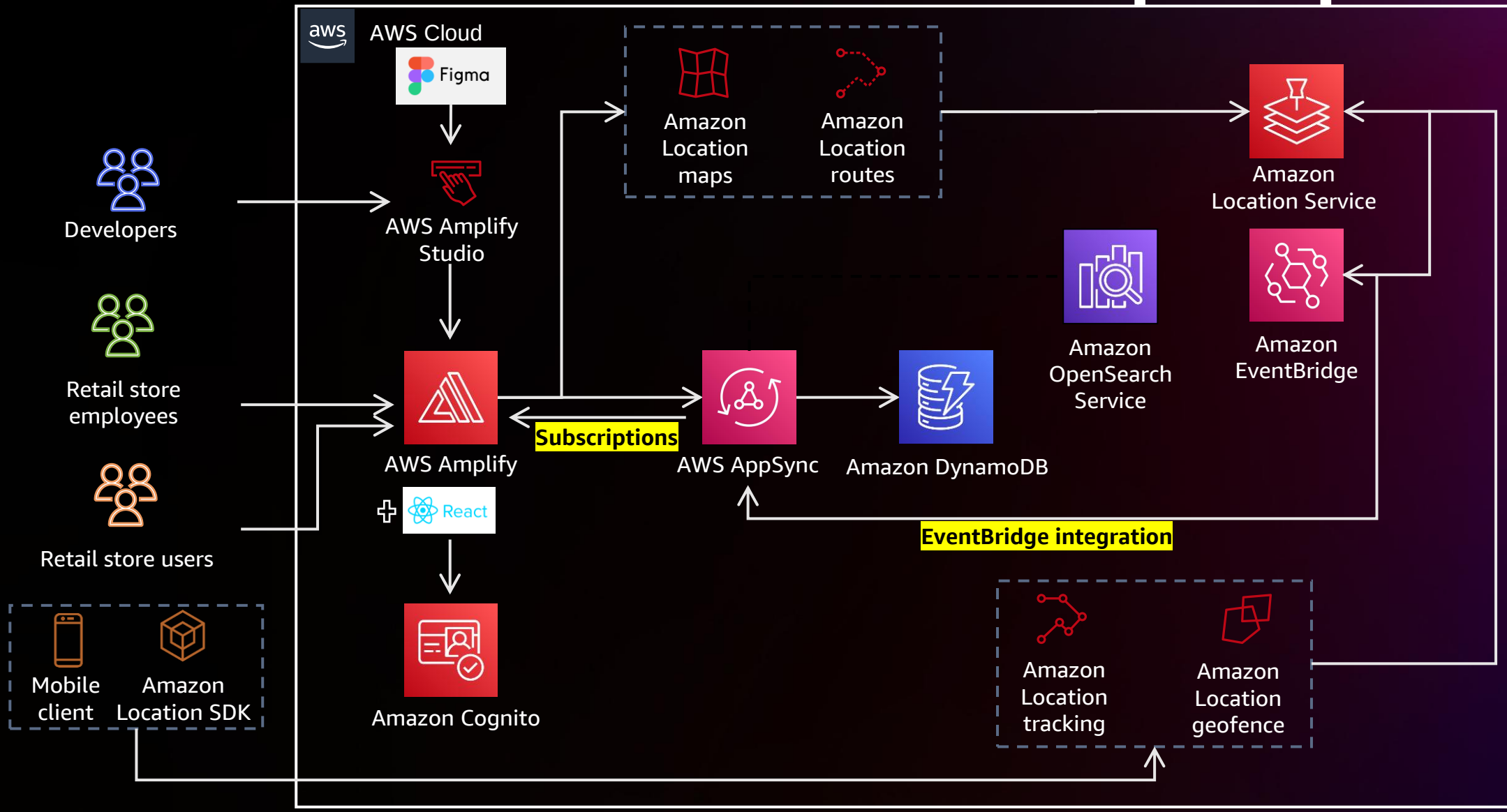




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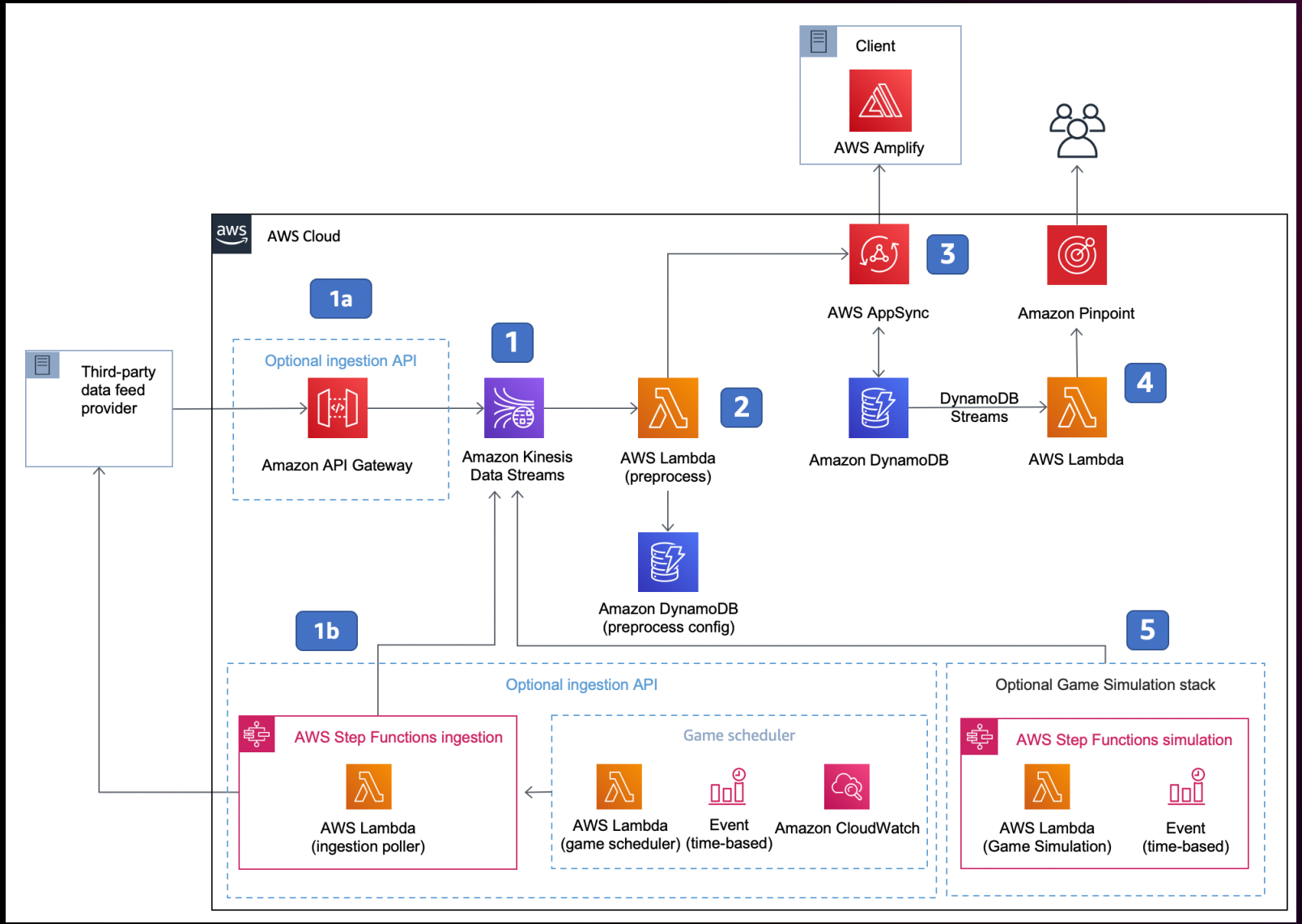
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E-commerce store locator and quick pick-up



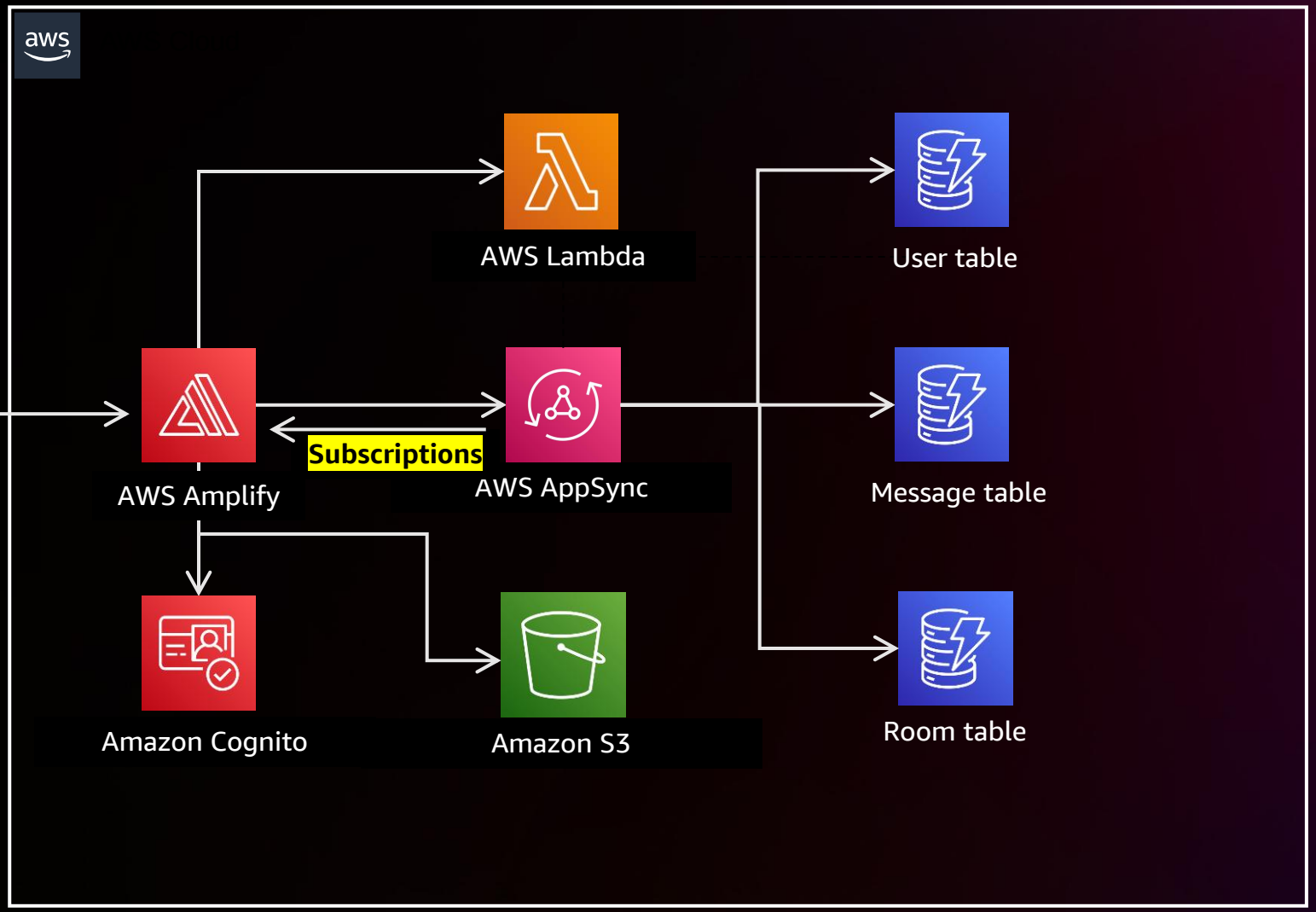
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Real-time live sports updates



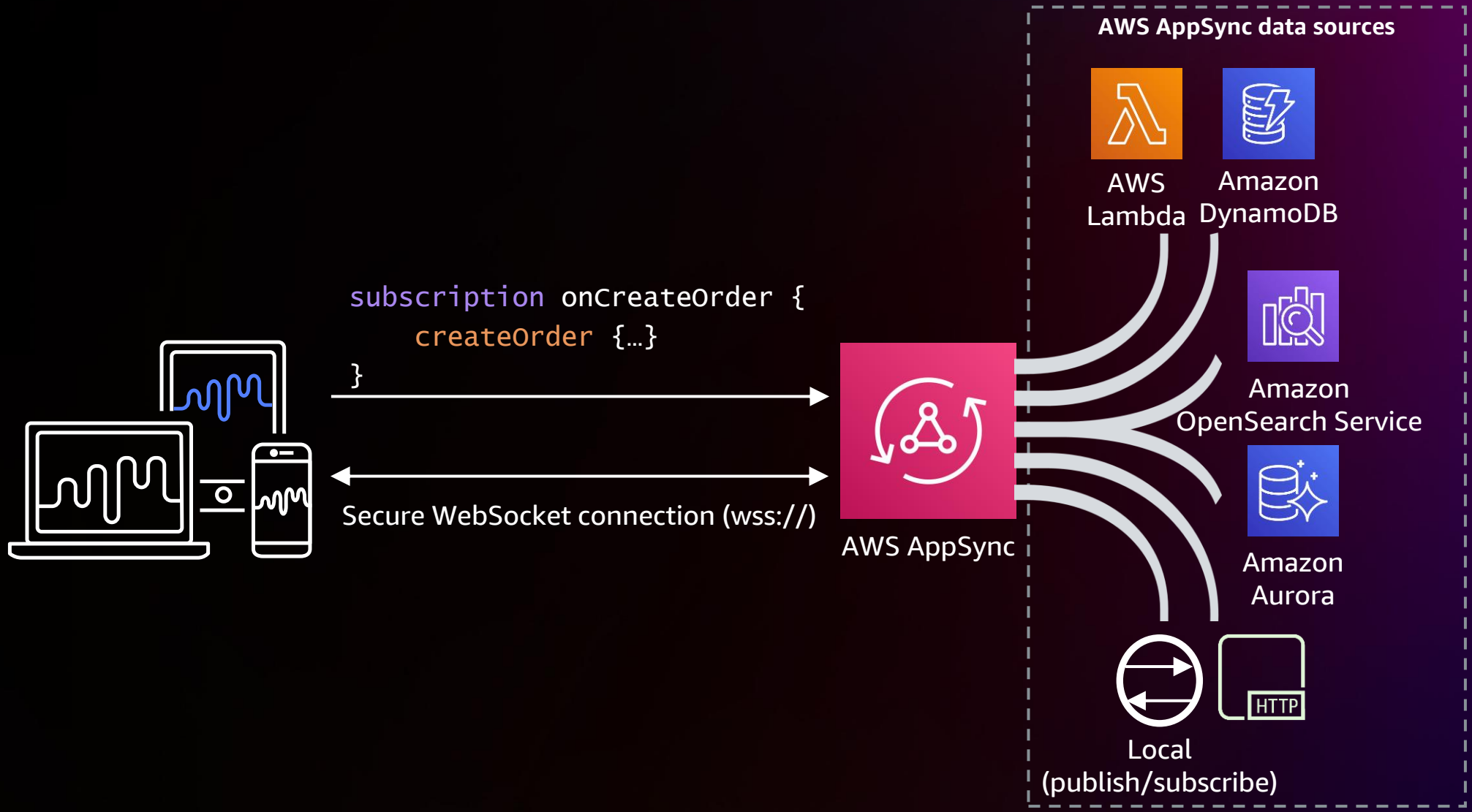
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Chat application



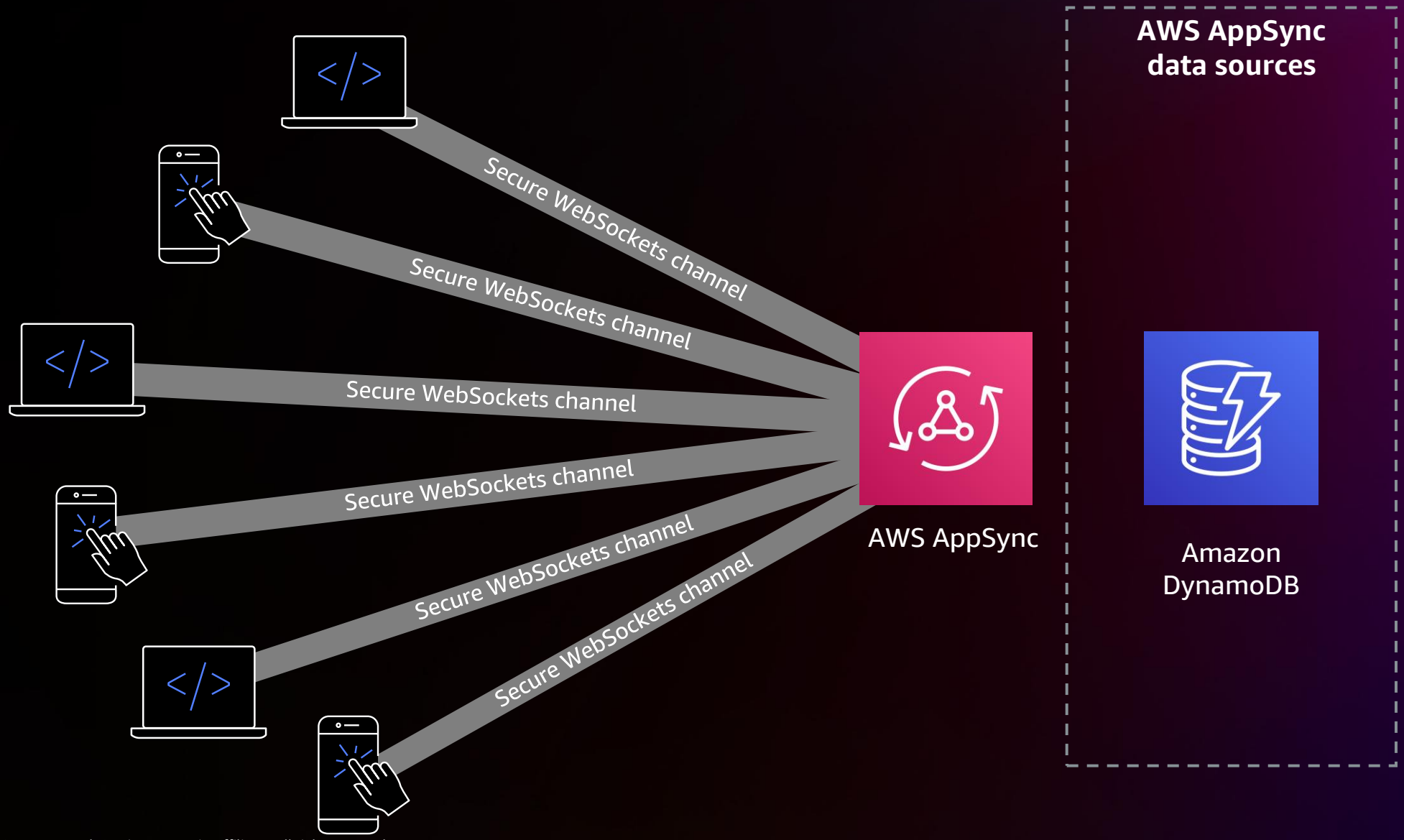
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Real-time GraphQL subscriptions



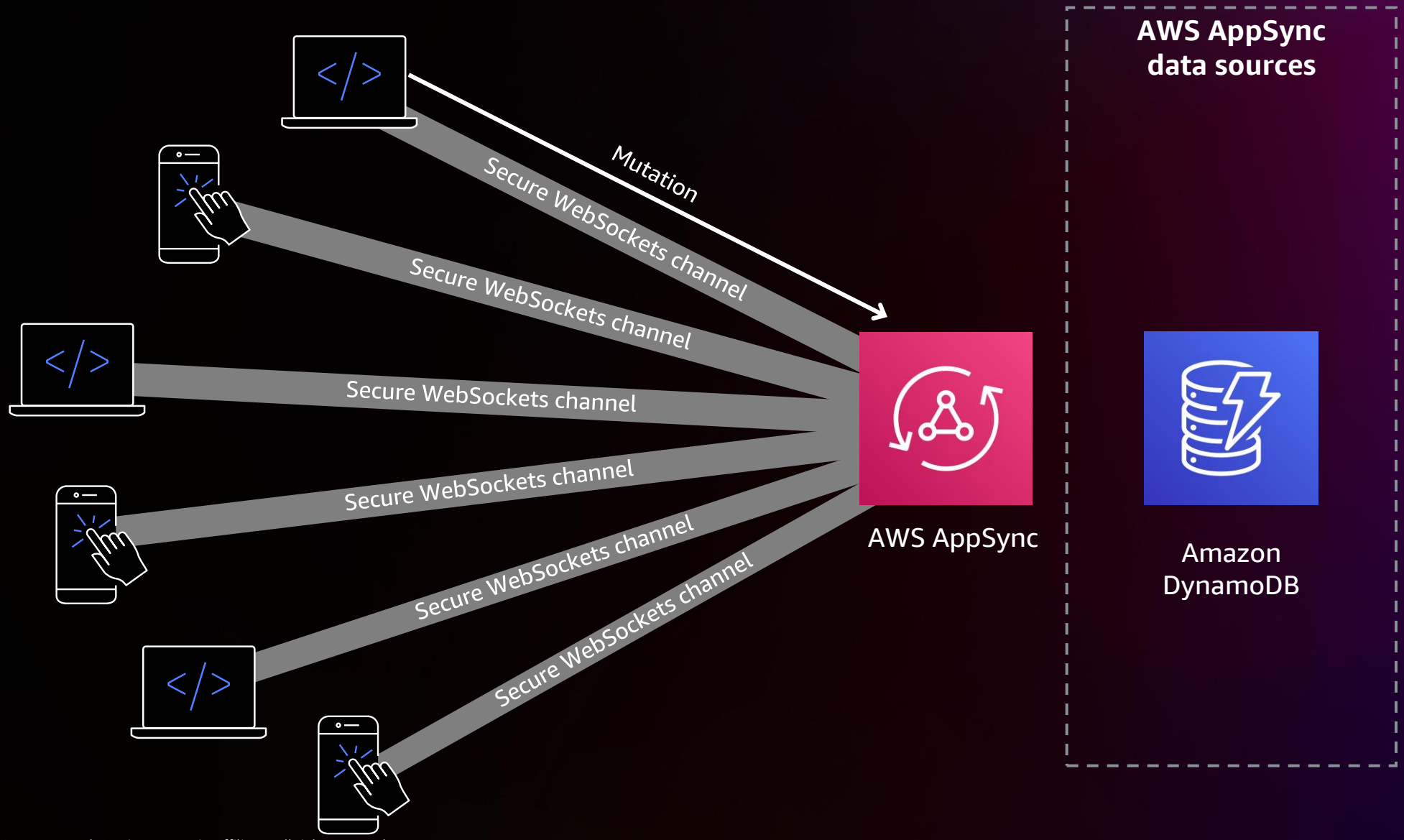
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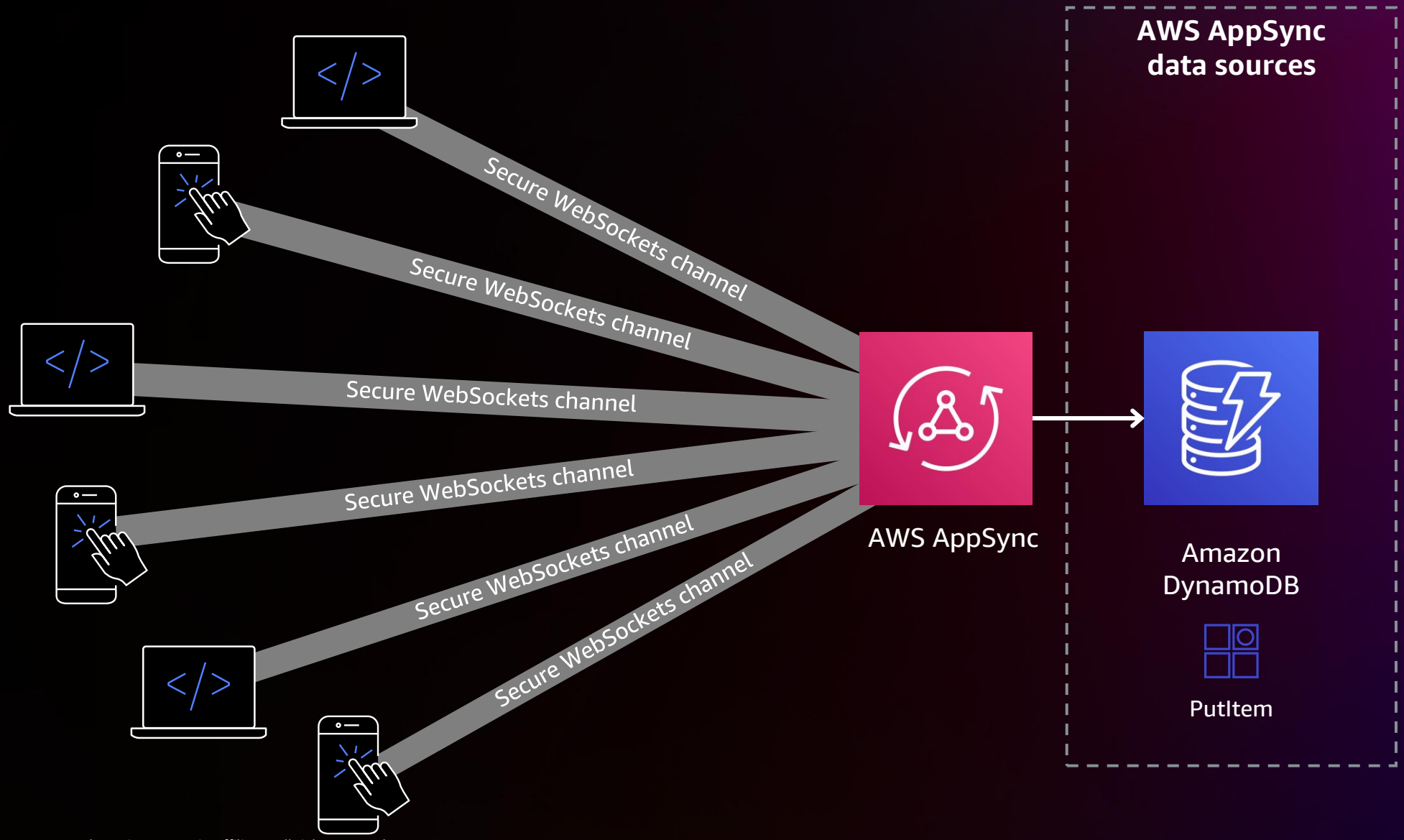
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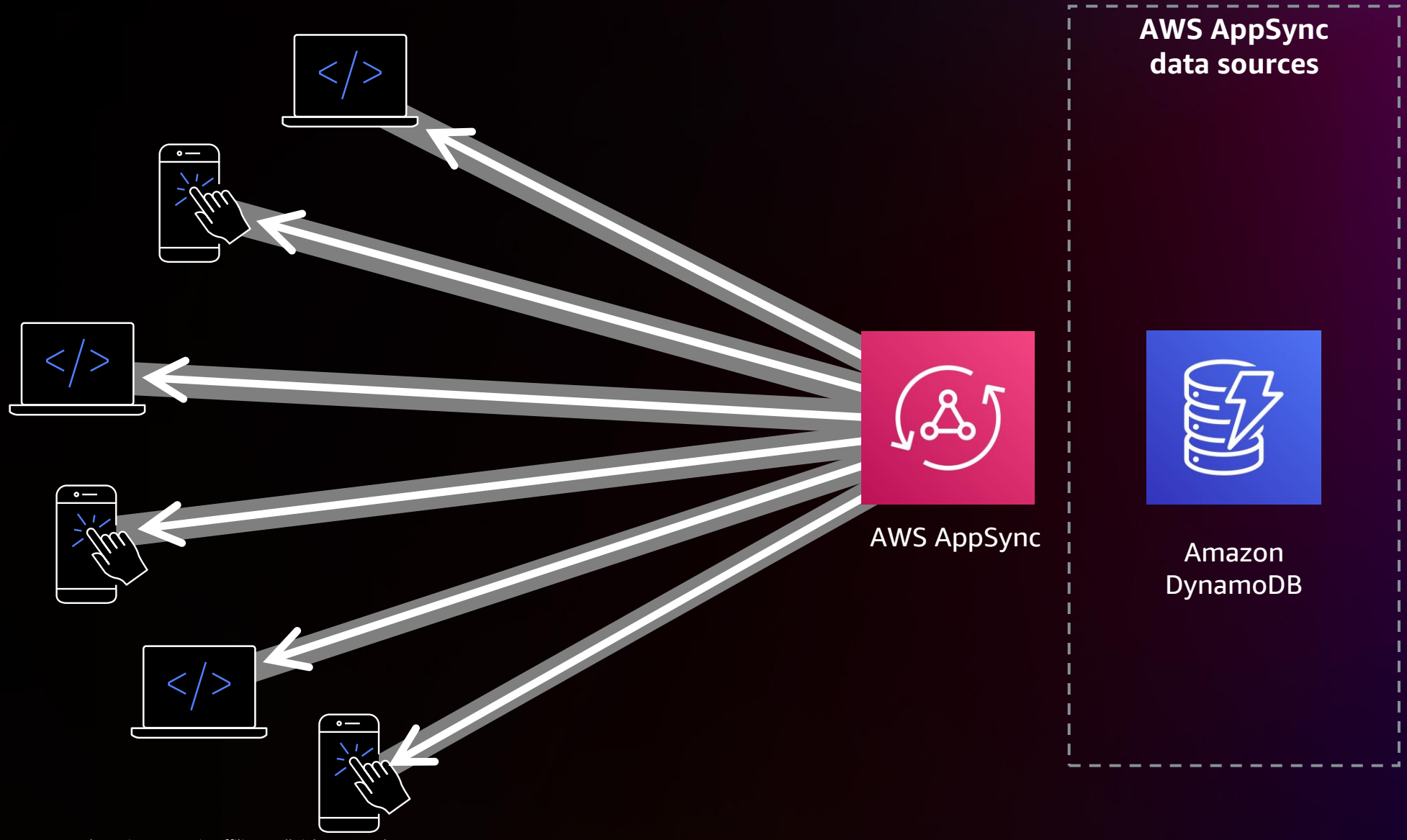
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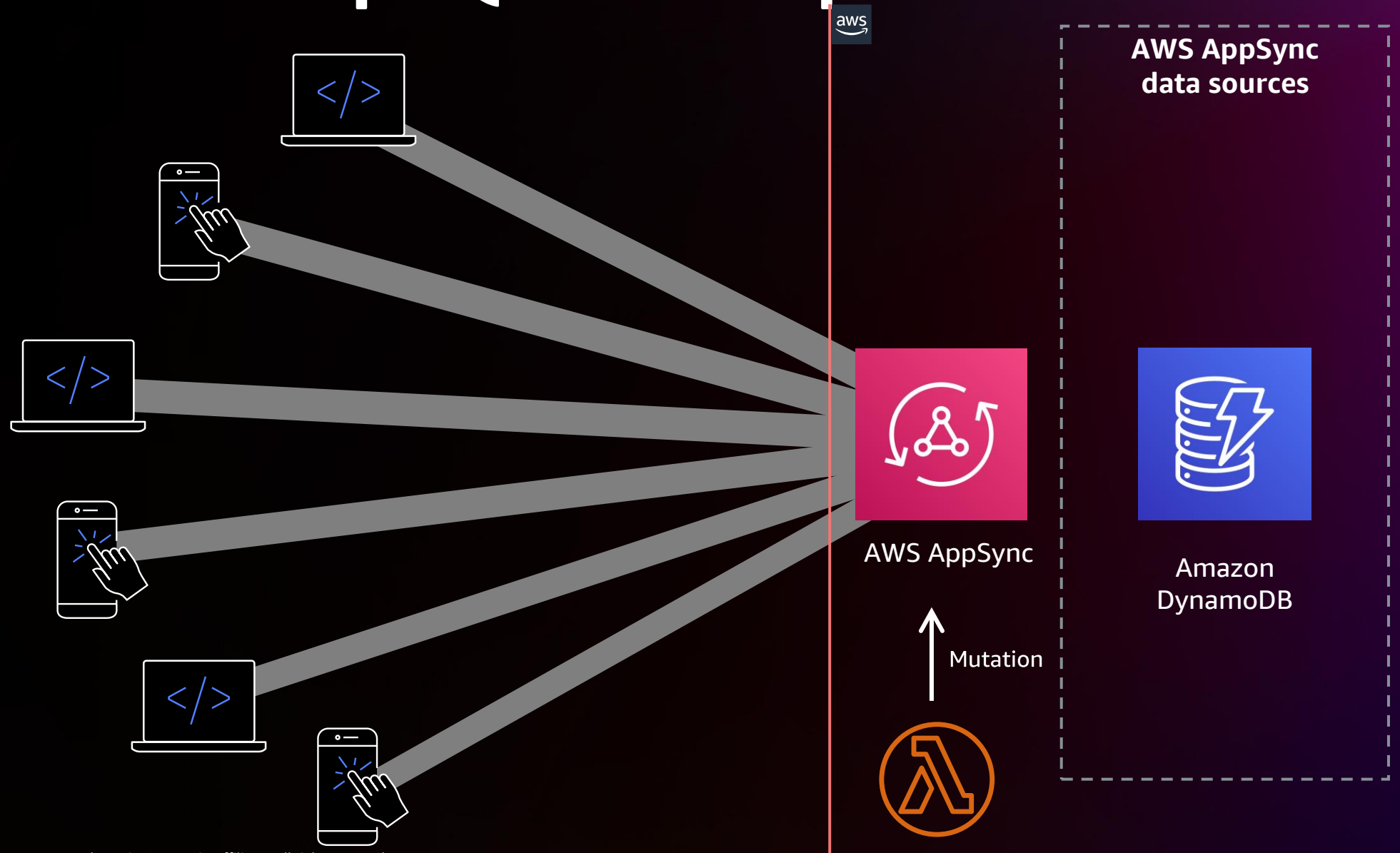
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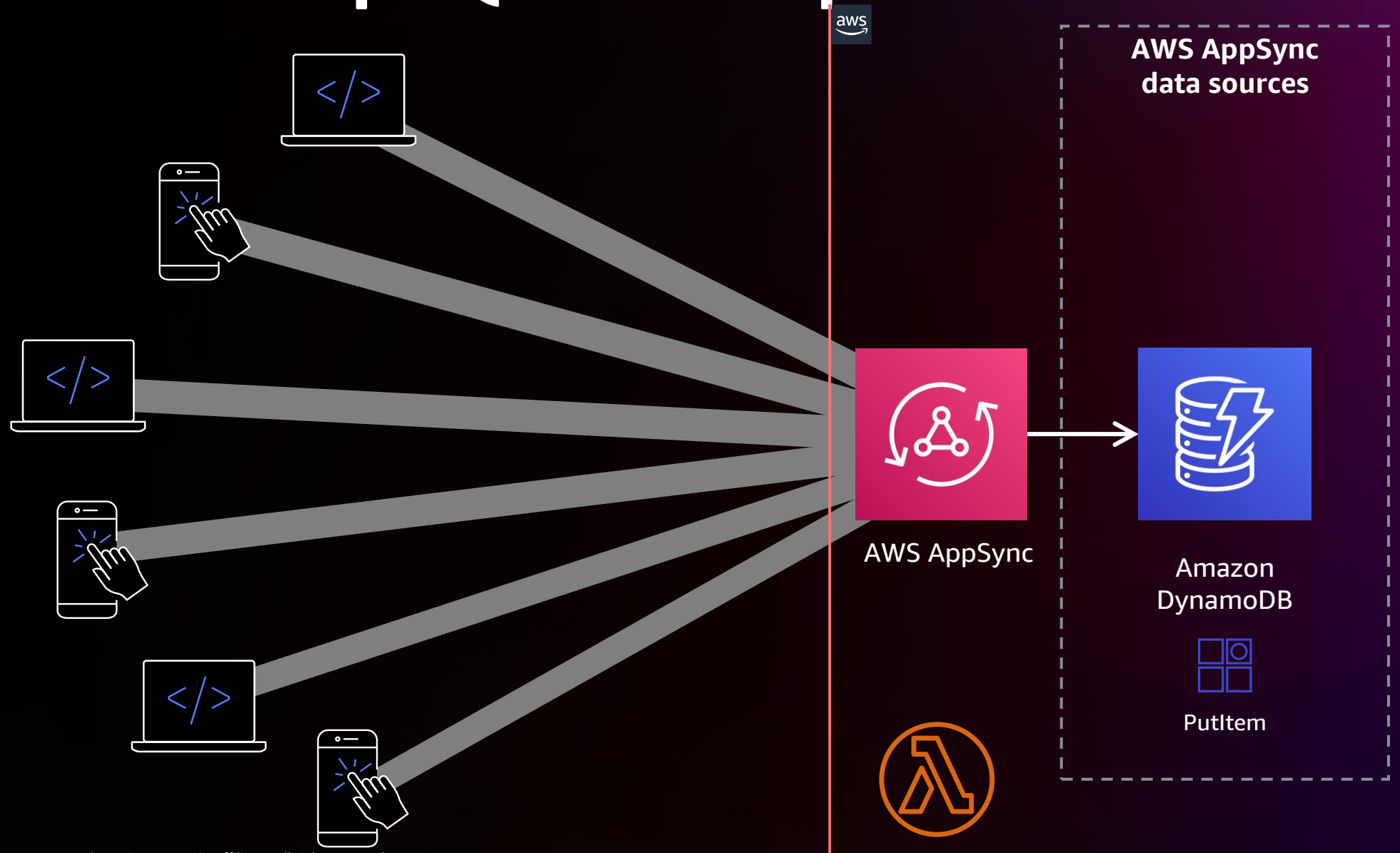
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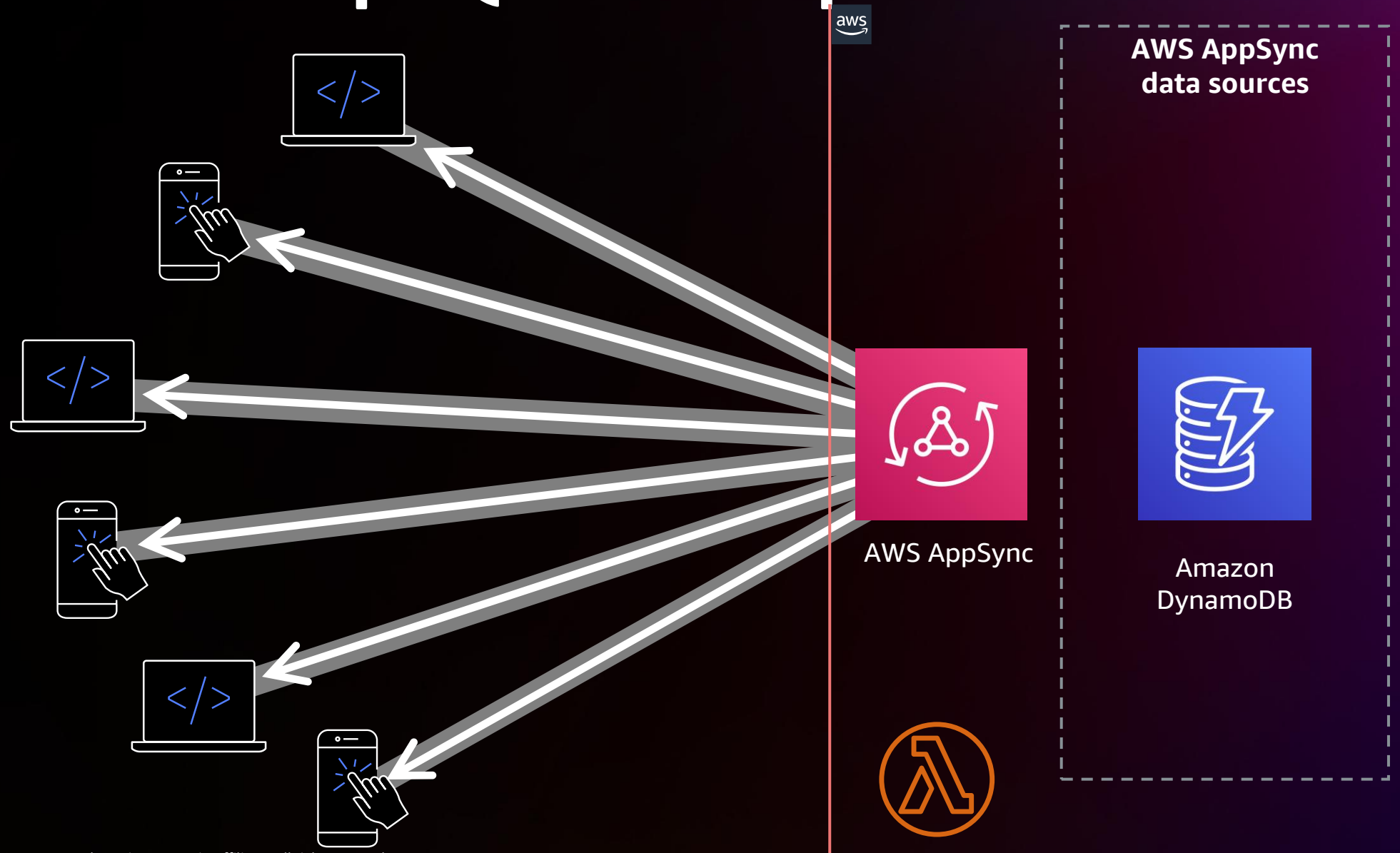
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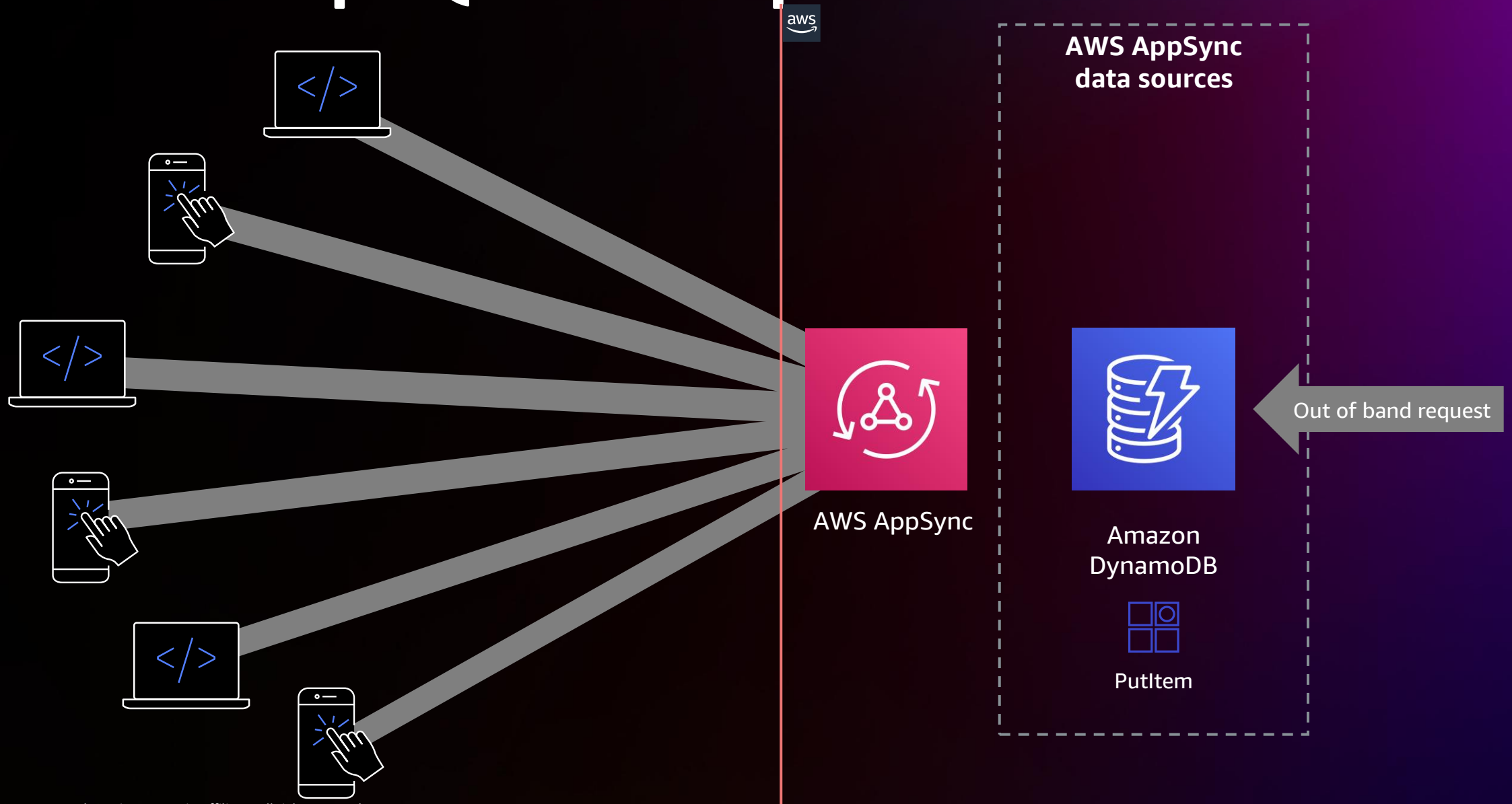
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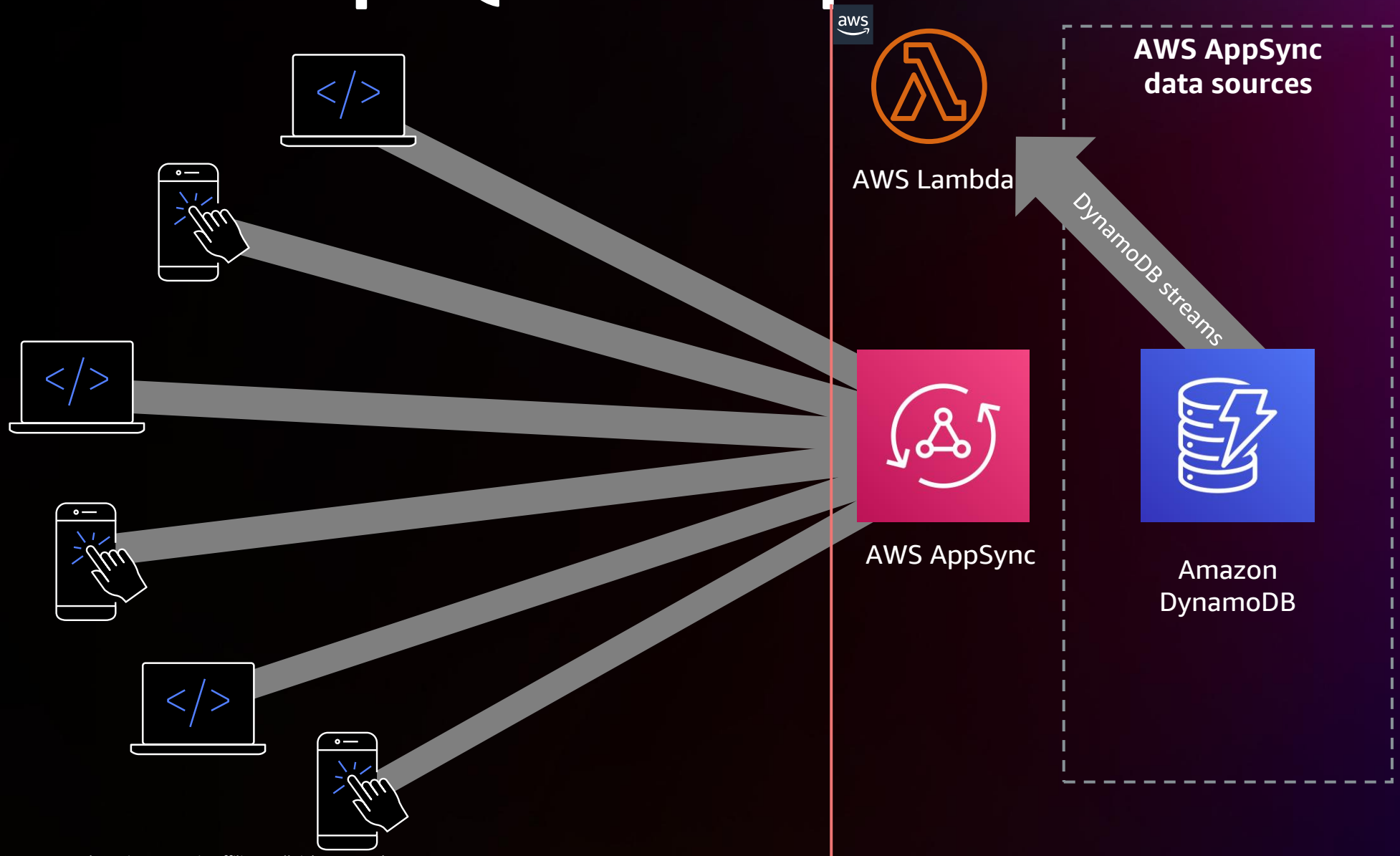
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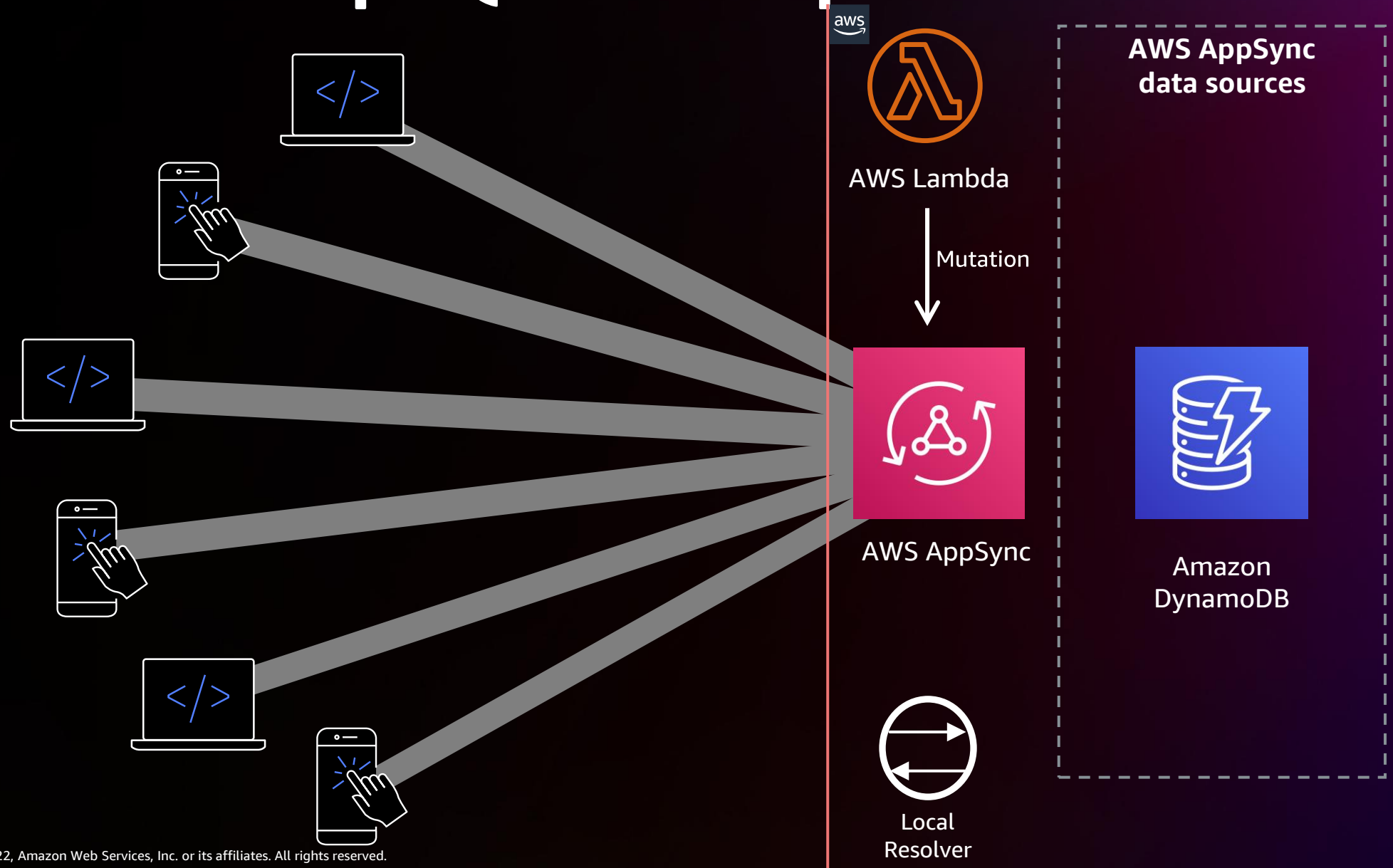
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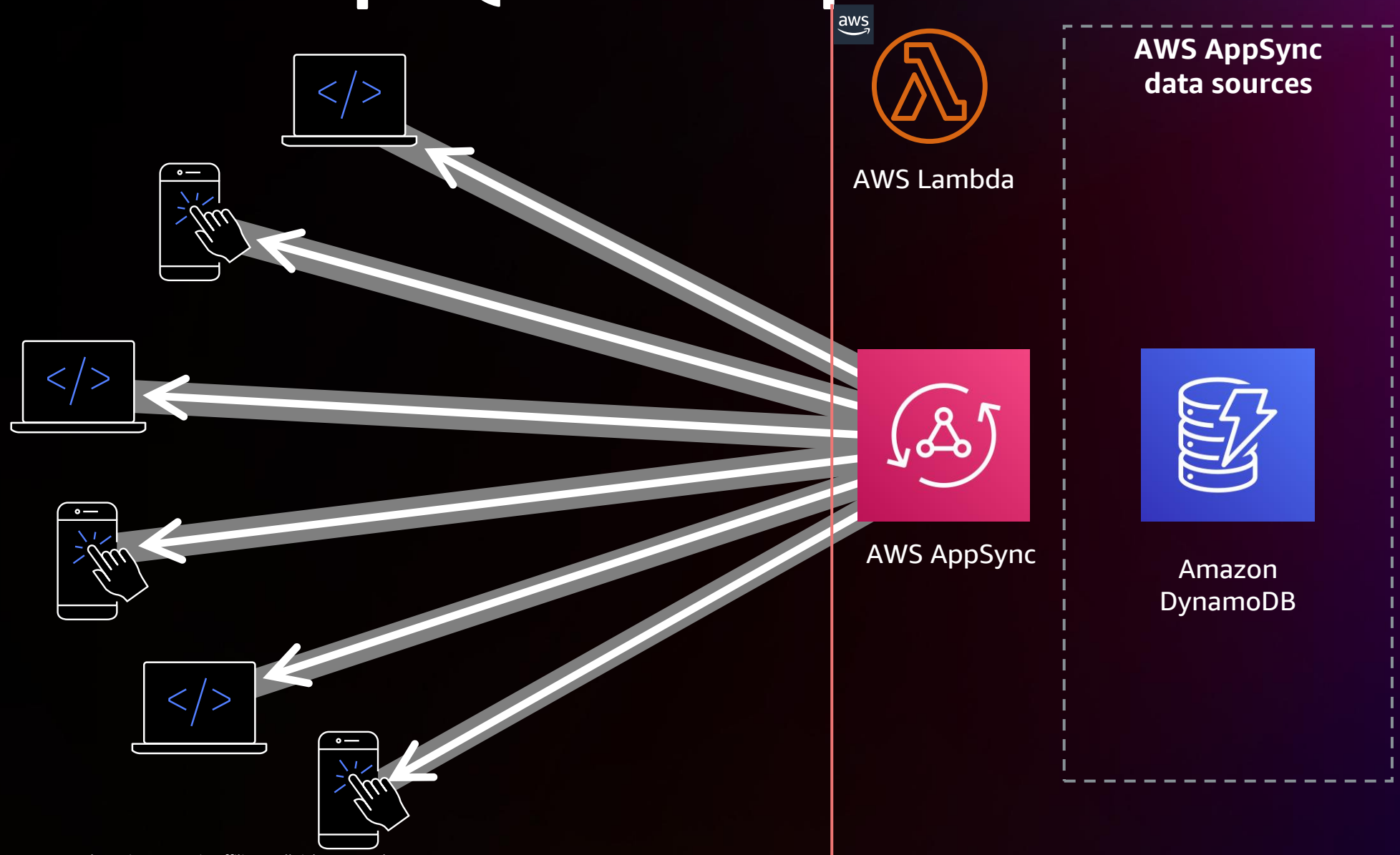
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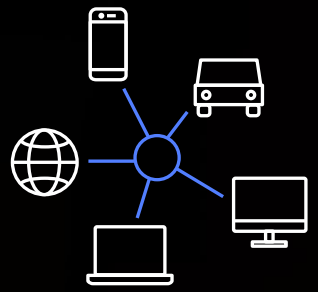
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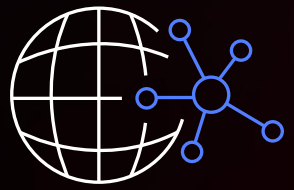
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Connection management



Scalability



Fan-out



Broadcasting



Metrics

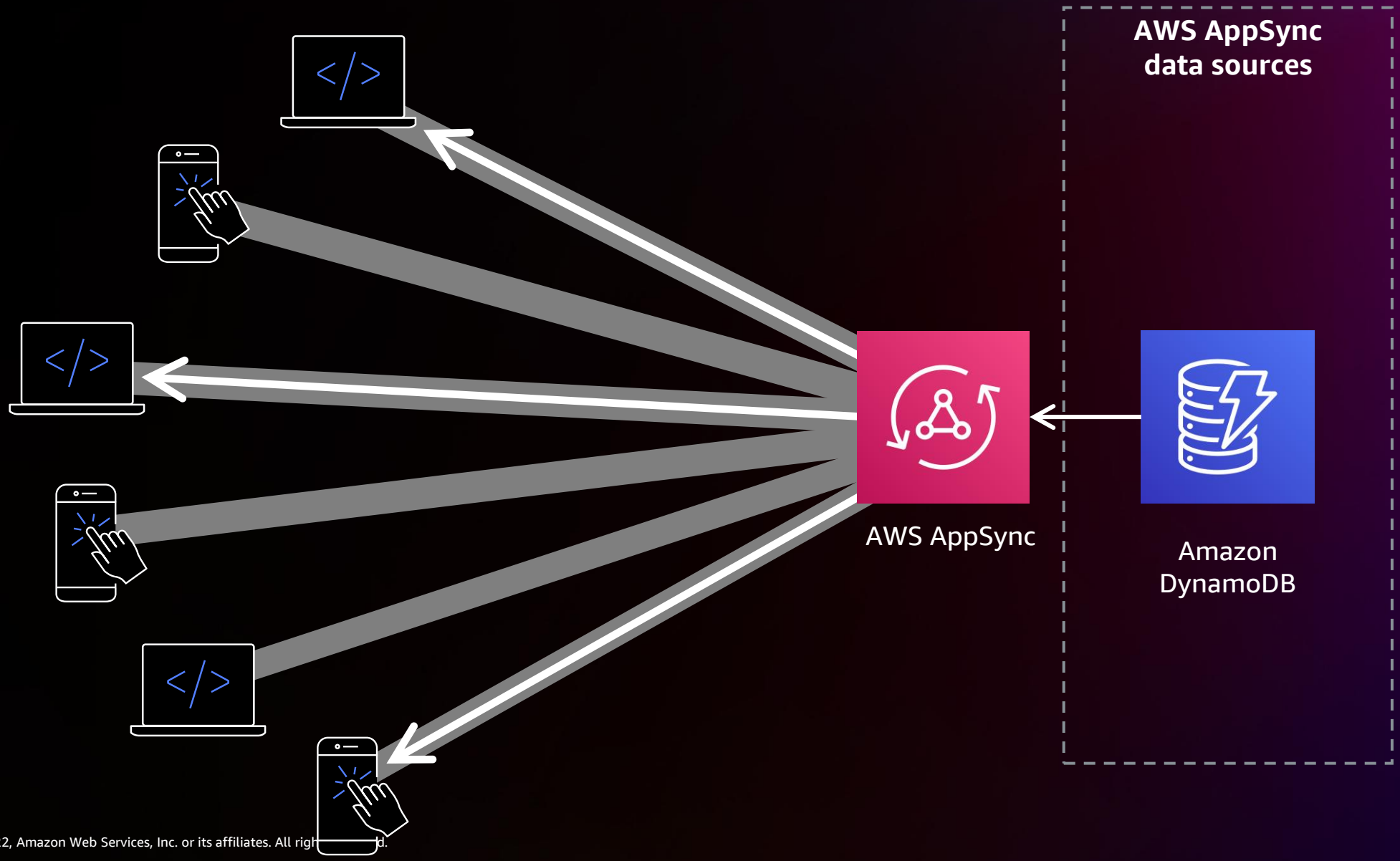
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Filtering

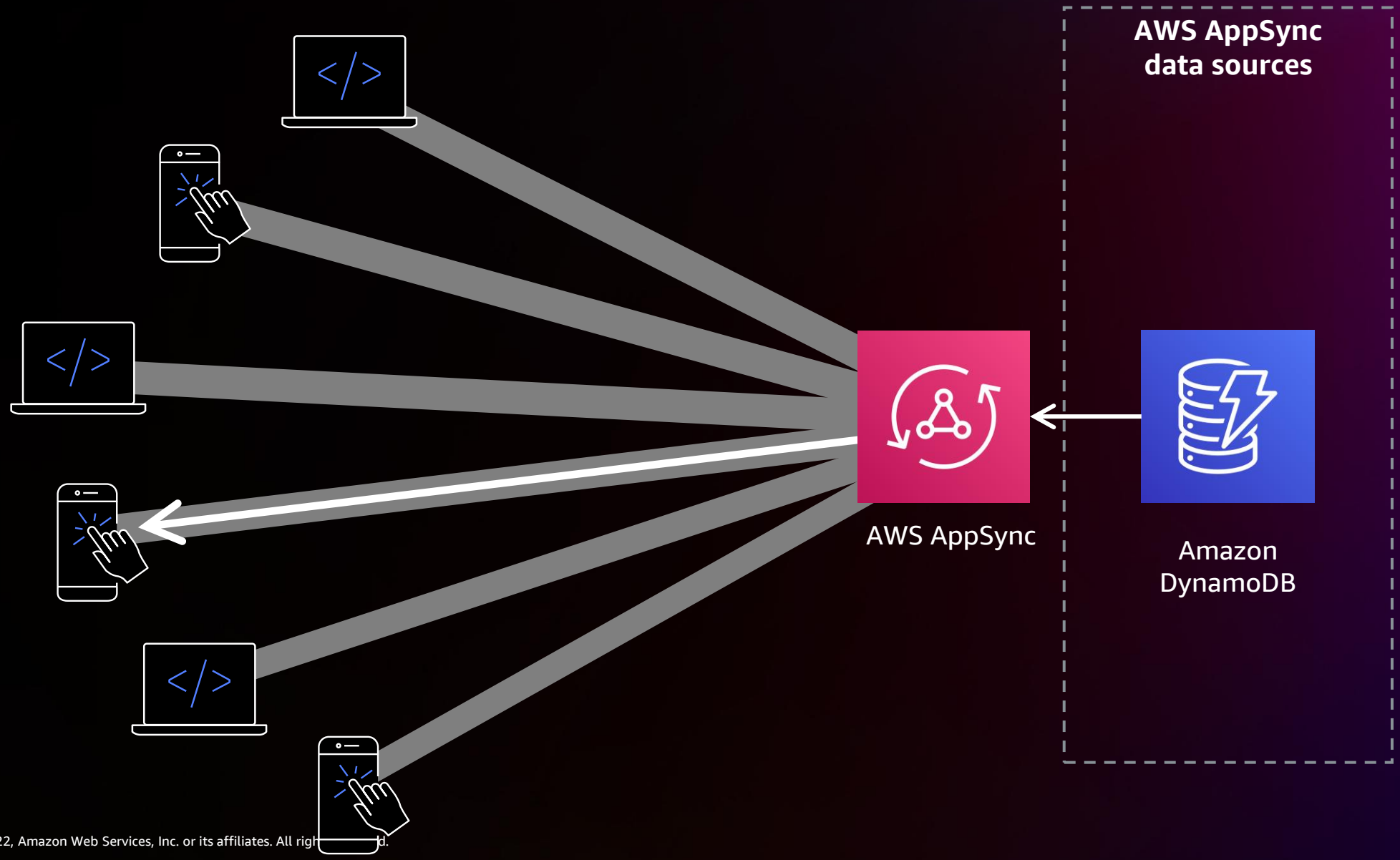
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Subscriptions filtering in AWS AppSync



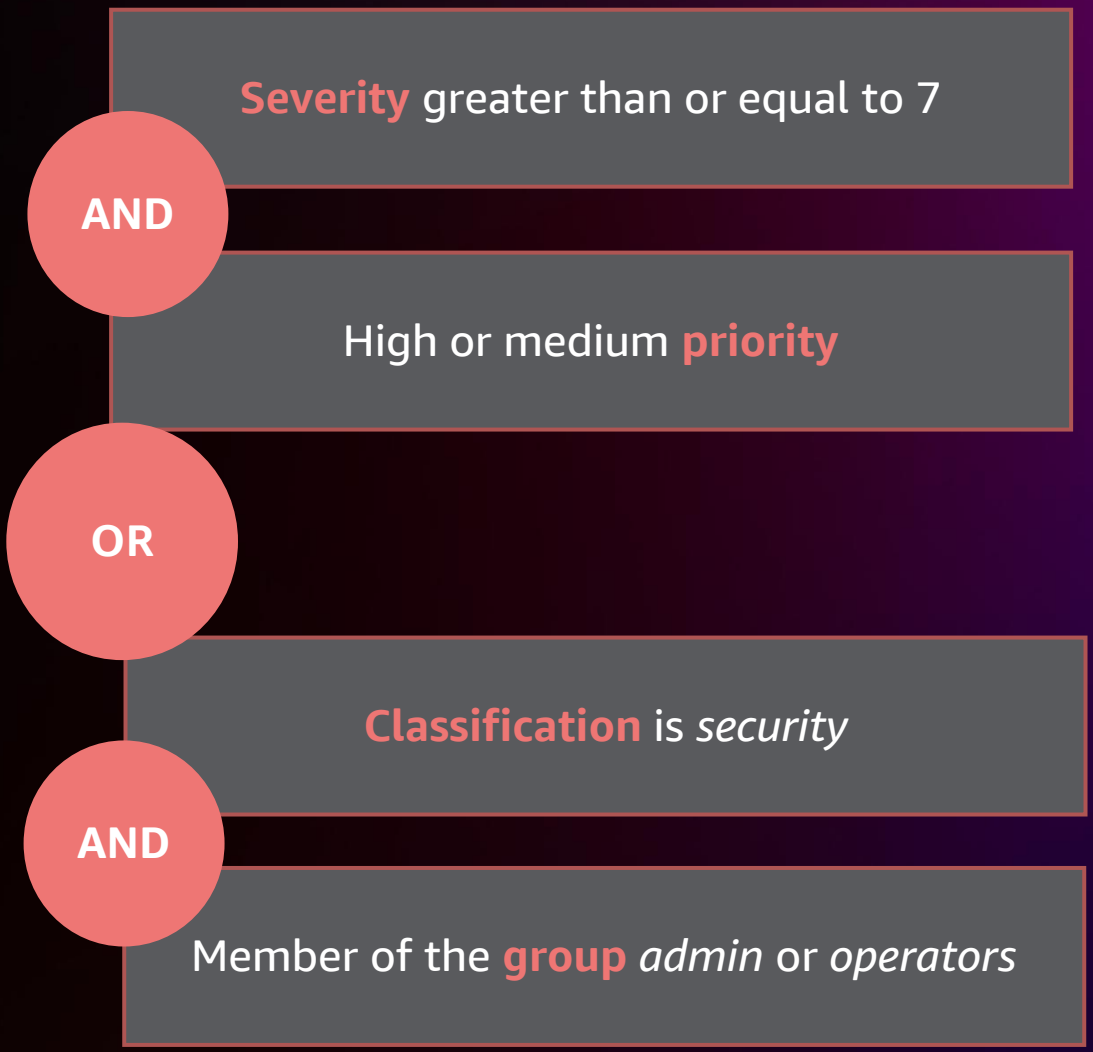
- Basic filtering
  - Up to 5 arguments, defined on the client
  - AND logic only
  - No operators
  - Strict equality
- Enhanced filtering
  - Multiple logical operators (and, or, contains, le, gt, in, between)
  - Defined centrally on the API backend or dynamically from the client
  - JSON format
  - Invalidation capabilities

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Filtering logic – Ticket management system

```
{
  "filterGroup": [{
                "filters": [{
                                "fieldName": "severity",
                                "operator": "ge",
                                "value": 7
                  },
                  {
                                "fieldName": "priority",
                                "operator": "in",
                                "value": ["high", "medium"]
                  }
                ]

    },
    {
                "filters": [{
                                "fieldName": "classification",
                                "operator": "eq",
                                "value": "Security"
                  },
                  {
                                "fieldName": "group",
                                "operator": "in",
                                "value": ["admin", "operators"]
                  }
                ]
    }
  ]
}
```

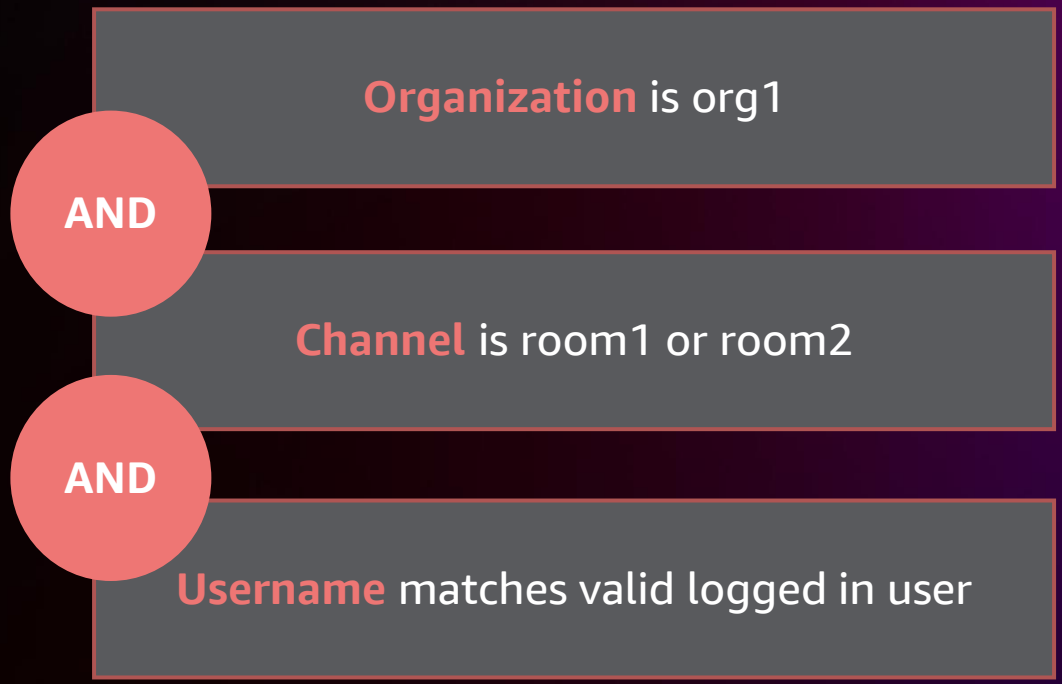


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Filtering logic – Chat application

```
{
  "filterGroup": [{
              "filters": [{
                          "fieldName": “org",
                          "operator": “eq",
                          "value": “org1"
                },
                {
                          "fieldName": “room",
                          "operator": "in",
                          "value": [“room1", " room2"]
                },
                {
                          "fieldName": “username",
                          "operator": “eq",
                          "value": $ctx.identity.username
                }
              ]

    }
]
}
```



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Dynamic client filtering – Real-time sports

```
"or" : [
        {
          "playerNames" : {
            "contains" : “Diego Ramirez"
          }
        },

        {
          "playerNames" : {
            "contains" : “Kwaku"
          }
        },
        {
          "playerNames " : {
            "contains" : “Mateo Jackson"
          }
        }

      ]
```

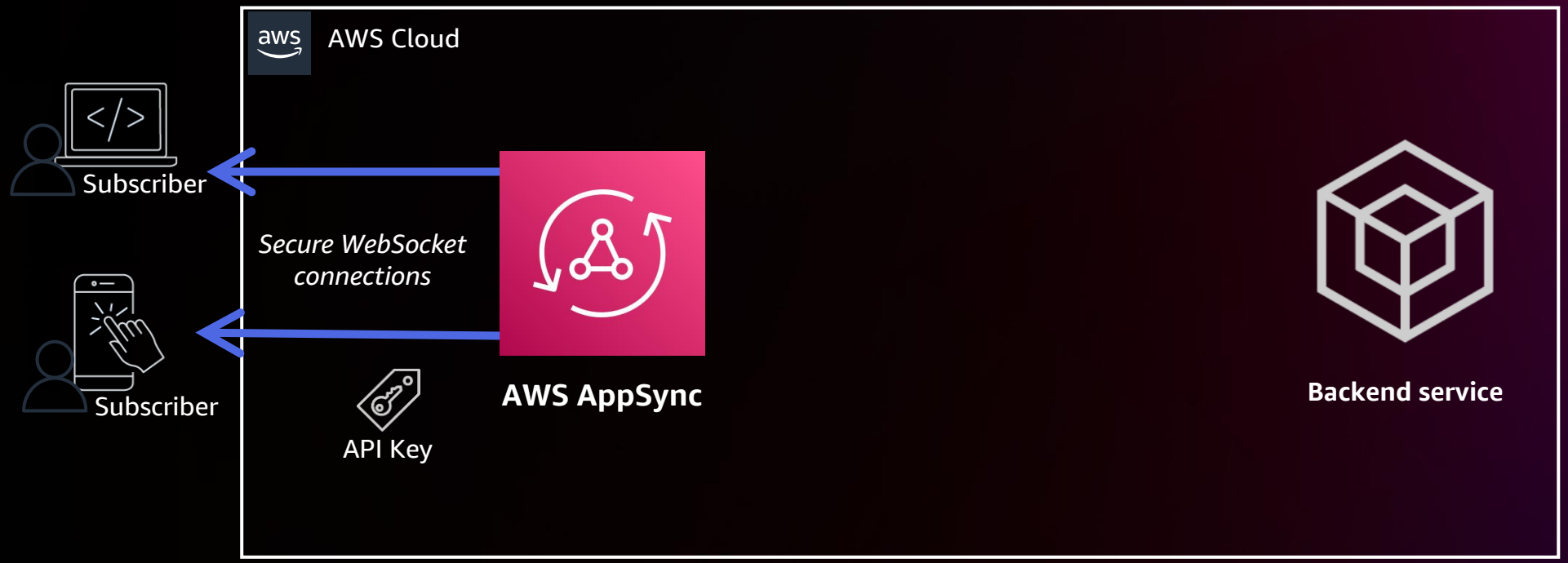


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Invalidation

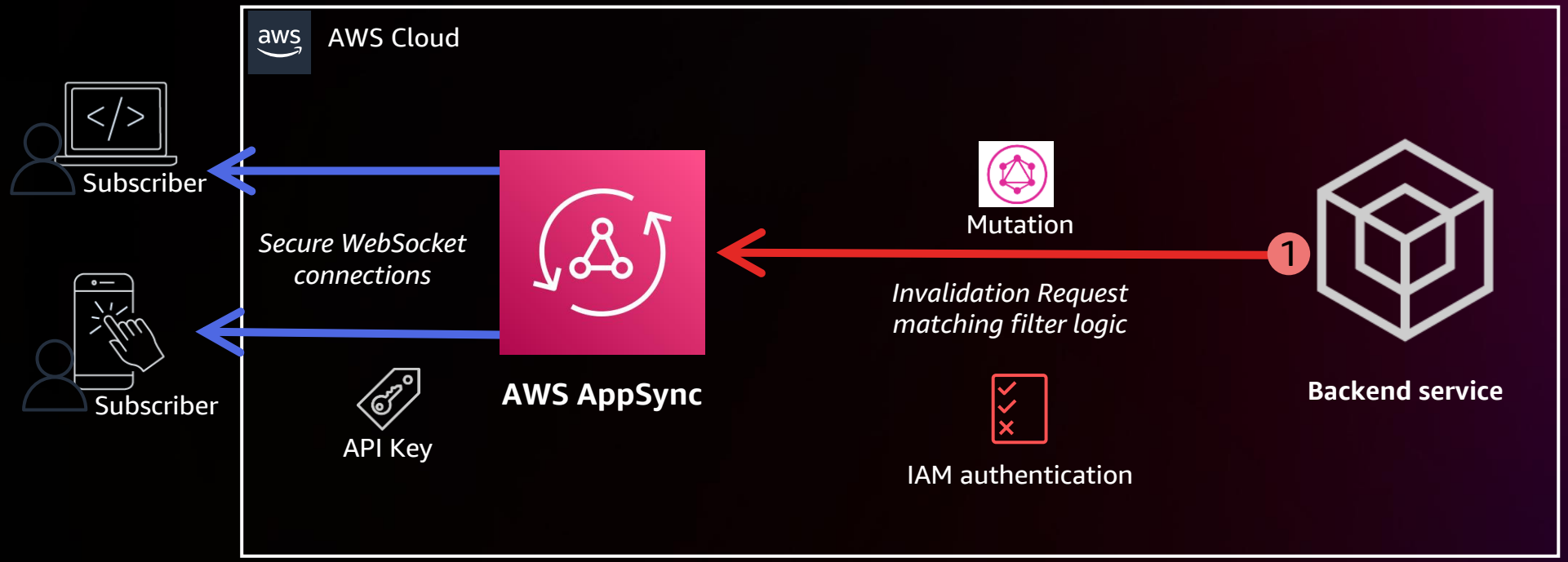
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Subscriptions invalidation



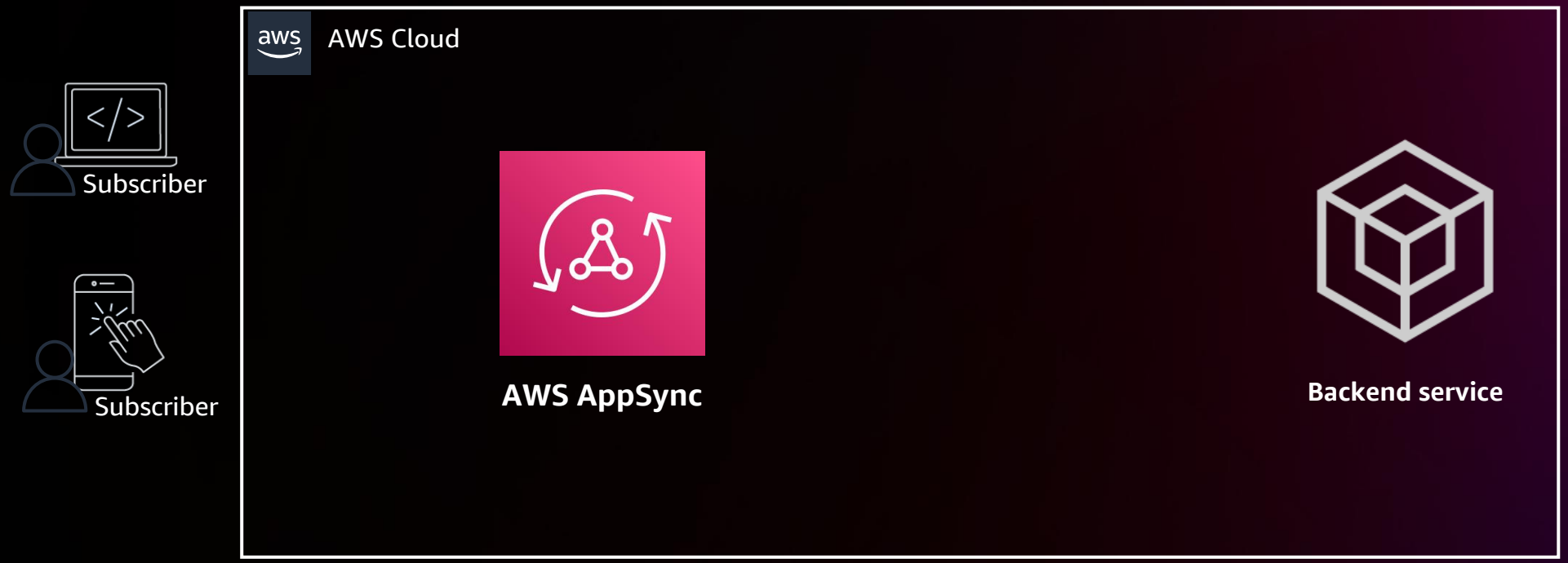
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Subscriptions invalidation



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Subscriptions invalidation



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Canceling a subscription – Chat application

When a mutation payload contains a username, the subscription is invalidated

onCreateMessage (subscription)

```
$extensions.setSubscriptionInvalidationFilter({
  "filterGroup": [
    {
      "filters" : [
        {
          "fieldName" : "username",
          "operator" : "eq",
          "value" : $ctx.identity.username
        }
      ]
    }
  ]
})
```

deleteConversationUser (mutation)

```
$extensions.invalidateSubscriptions({
    "subscriptionField": "onCreateMessage",
    "payload": {
      "username": $ctx.identity.username
    }
  })
```

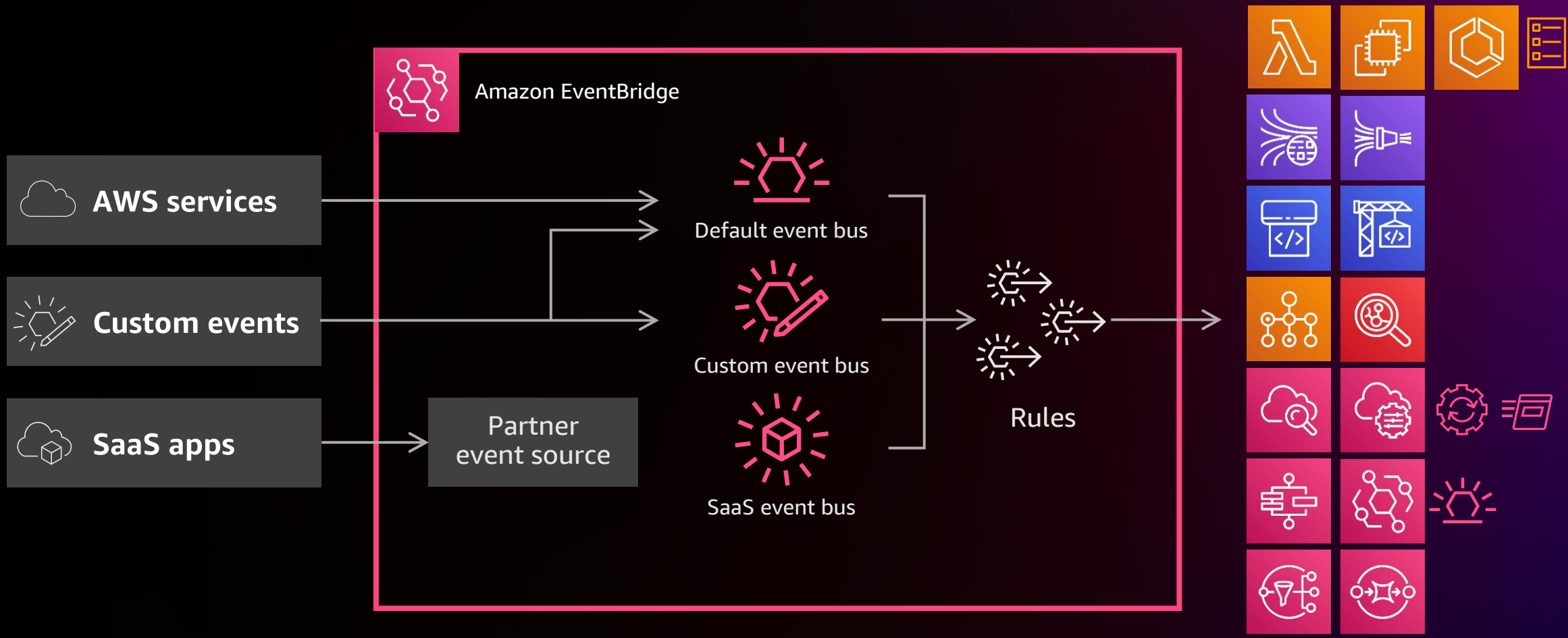
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Amazon EventBridge integration

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Amazon EventBridge



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Event-driven apps



Event-driven

Connect loosely coupled systems





Real-time

Millions of connected clients

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AWS EventBridge integration

- Producers and consumers are loosely coupled
- Choreograph operations across systems or domains
- Add real-time capability with/without GraphQL knowledge
- Connect any two disparate systems together with this architecture
- Publishing “out-of-band” updates to subscribers
- Deliver to multiple targets
- Rich set of rules and filtering capabilities
- Use API destinations to trigger an AWS AppSync update
- Data persistence is optional

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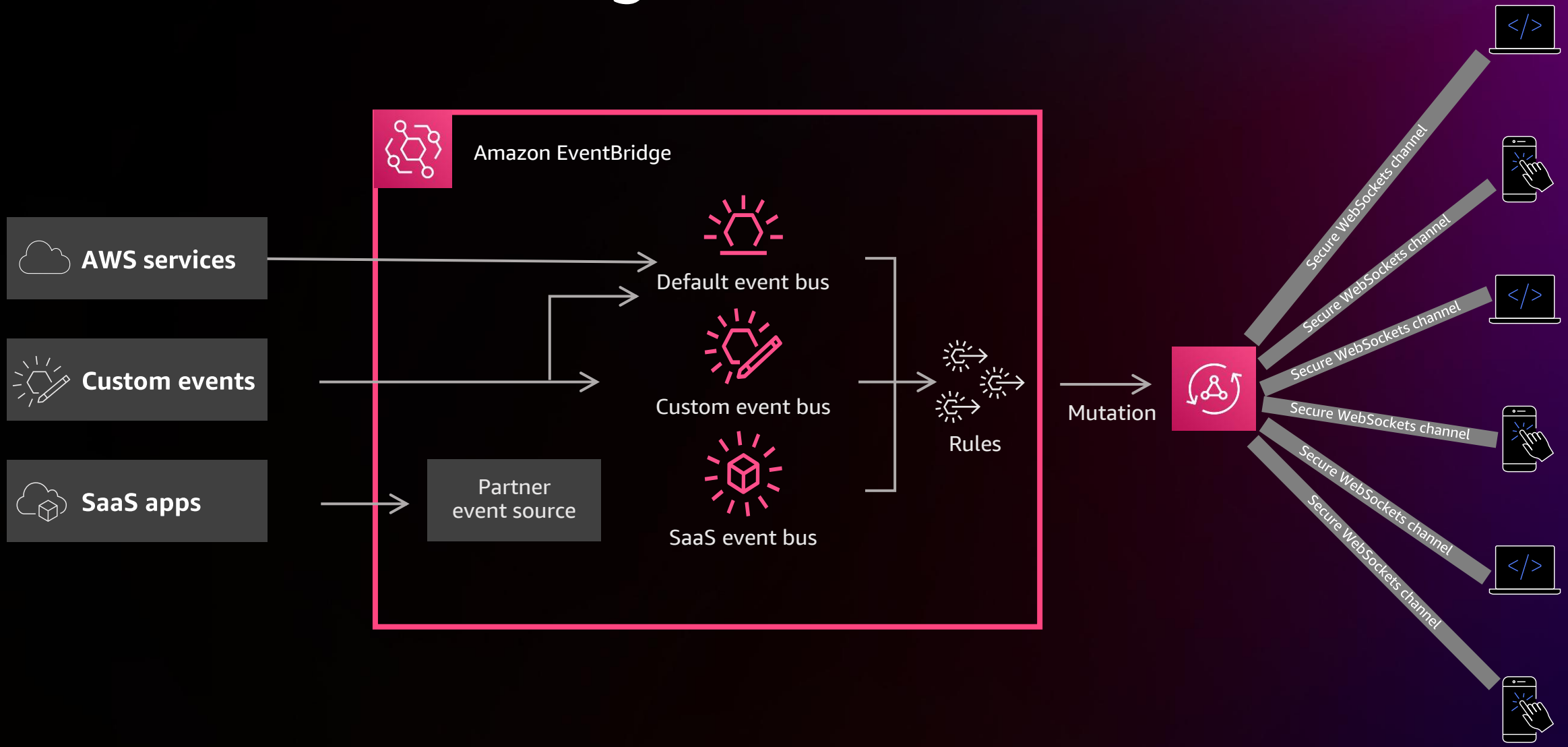
Use cases

- Send specific events to one client (1:1)
  - Order fulfillment
  - Incident response
  - Location tracking
- Send events to multiple clients (fan out)
  - IoT devices
  - Partner events

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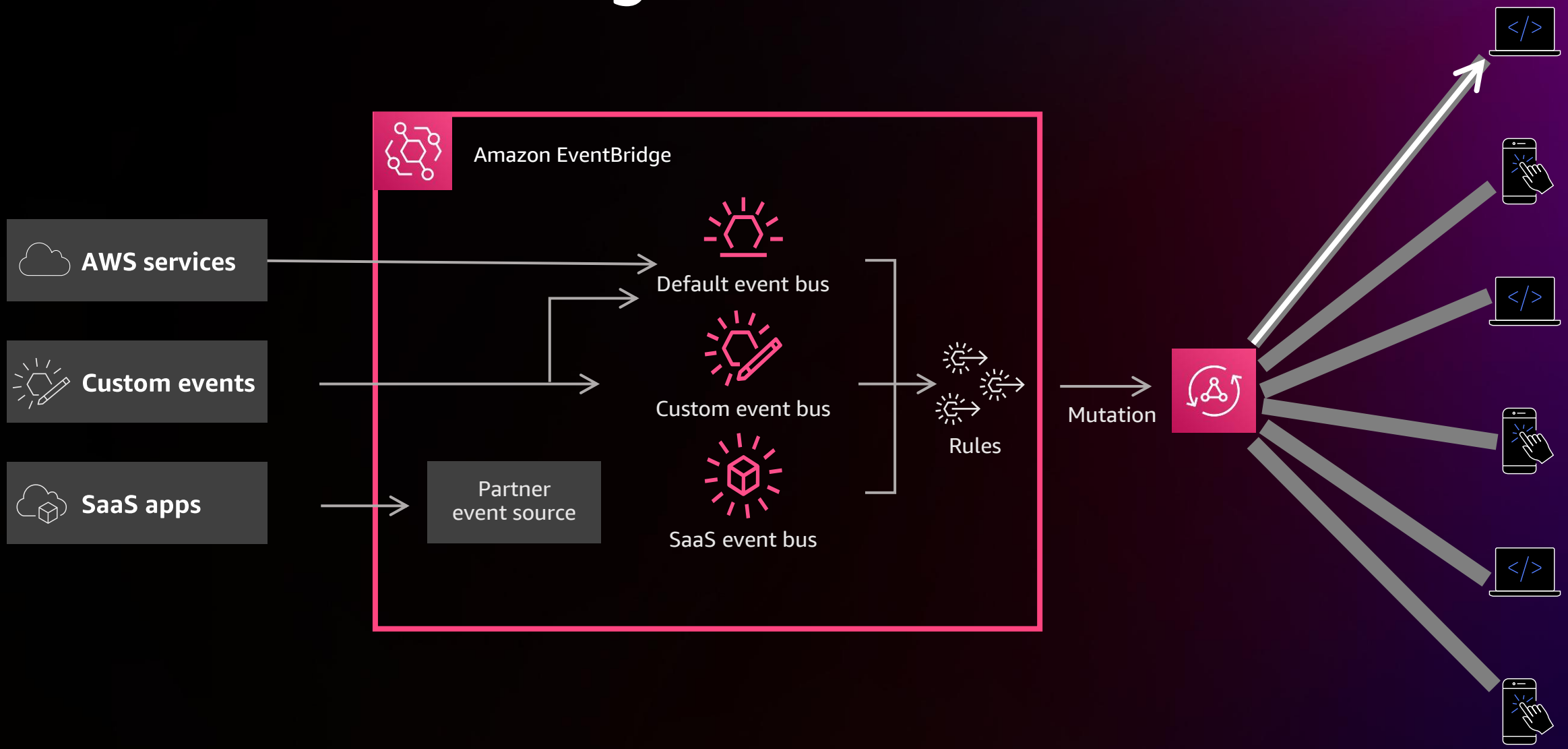
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Amazon EventBridge



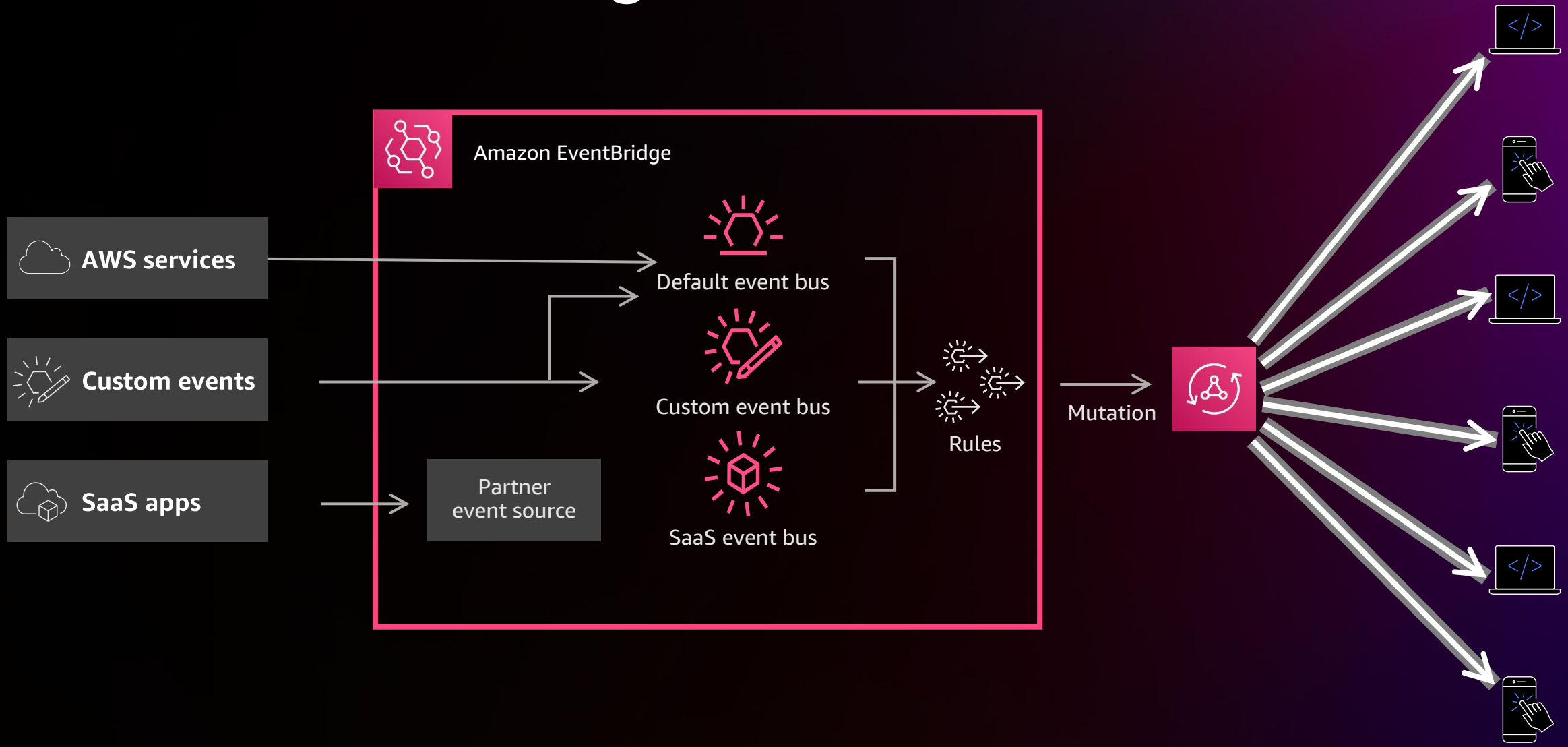
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Amazon EventBridge



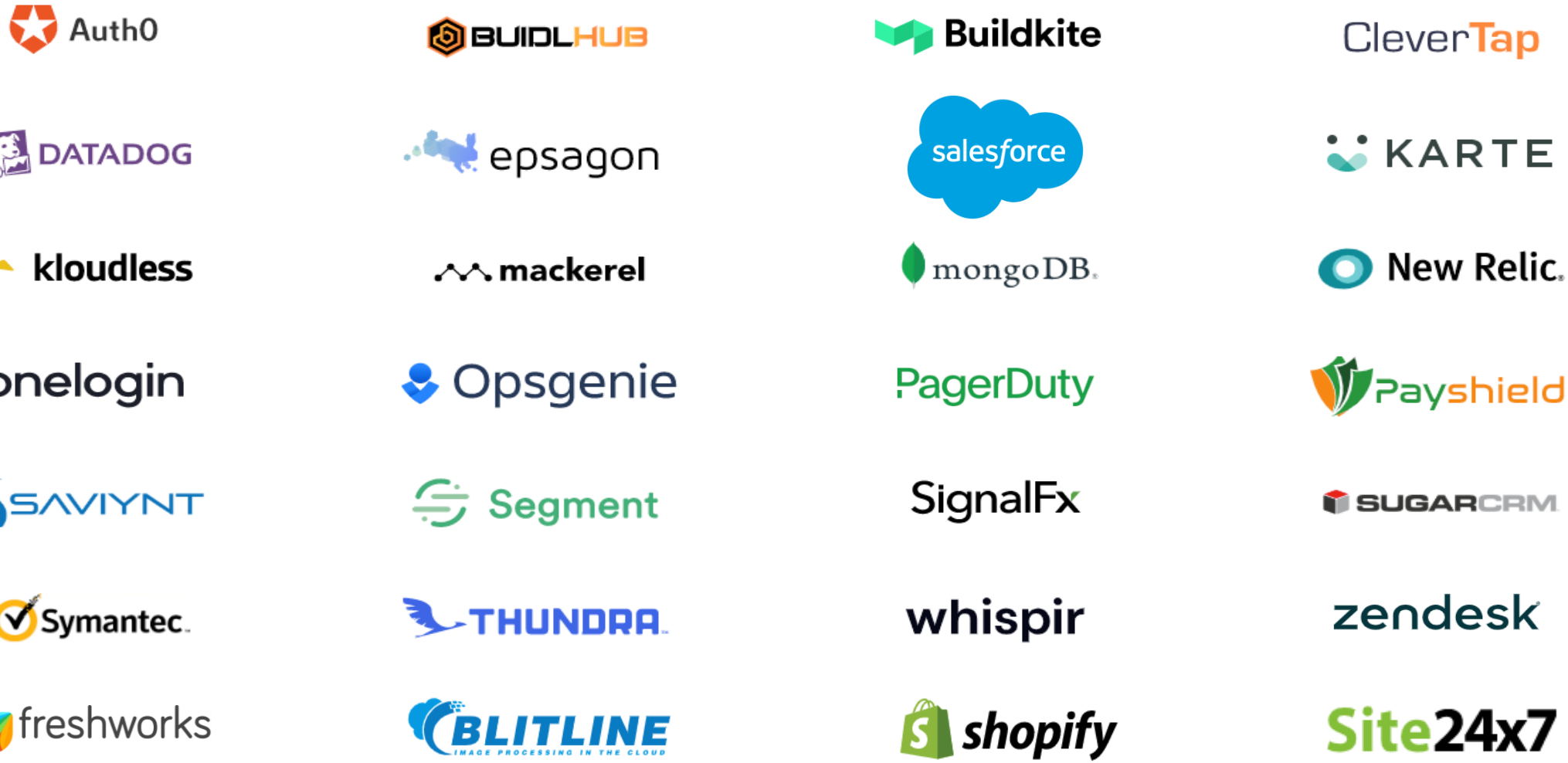
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Amazon EventBridge



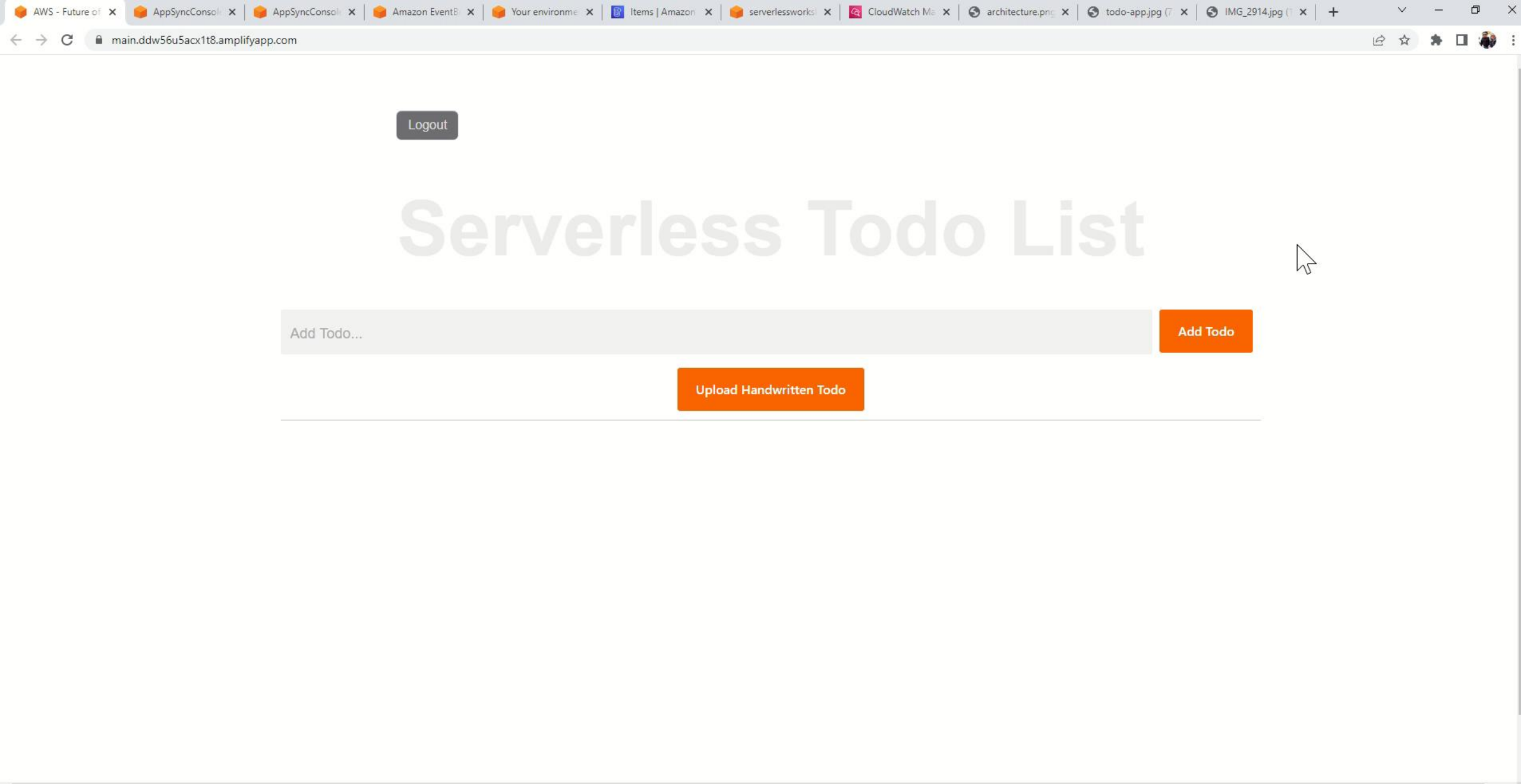
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Amazon EventBridge SaaS app integrations



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