

# *Beehive Update*

 Local-First Access Control 

**Brooklyn Zelenka**

@expede



[github.com/expede](https://github.com/expede)

# Brooklyn Zelenka

@expede

- Beehive project lead 🐝
- Work(ed) on related projects:
  - UCAN (local-first mutation control)
  - Webnative File System (E2EE)
  - Rhizome DB (E2EE)
  - ERC-902 (on-chain access control)



[github.com/expede](https://github.com/expede)

Beehive Update 

# ***The Highest of Levels***

Beehive Update 

# *The Highest of Levels*

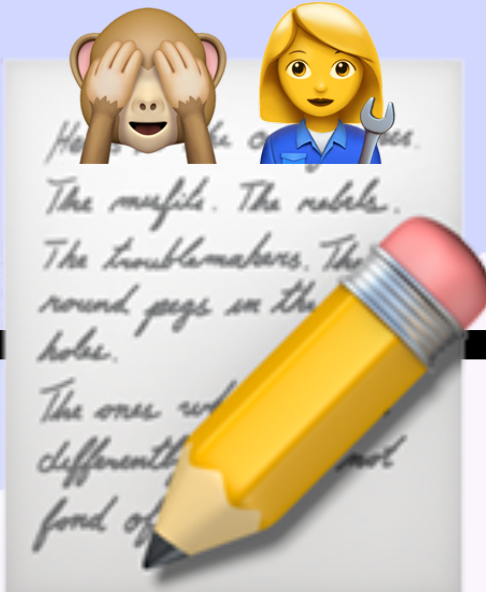
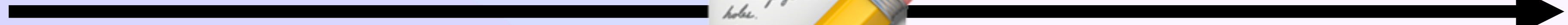
- Comparable experience to cloud auth, minus the servers
- Control who can read and write to documents
- Compatible with swappable/interoperable sync servers
  - Not store data in plaintext on those servers (encryption at rest)
  - ...but still be efficient: support Automerge compaction
- "Wikipedia-scale" (100k+ docs, 10k+ E2EE readers, 1k+ writers, 100s admins)
- Secure "at level of the FBI, but not necessarily NSA or Mossad"

Beehive Update 

# ***Cloud Auth Flow***

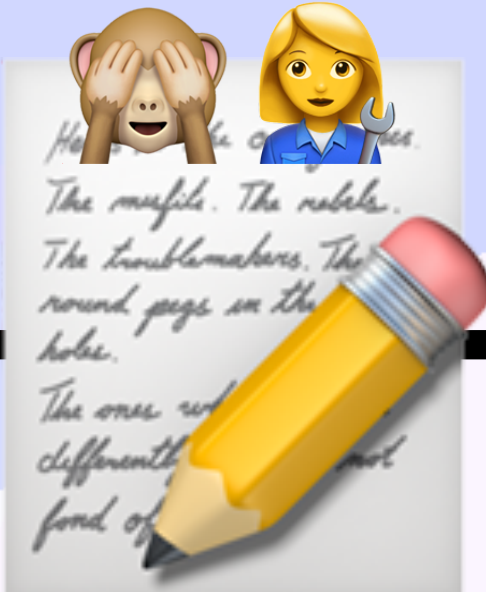
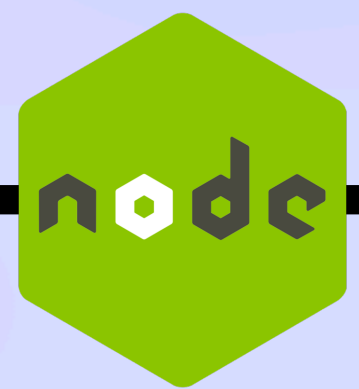
Beehive Update 

# Cloud Auth Flow



Beehive Update 

# Cloud Auth Flow





Beehive Update 

# *Cloud Auth Flow*



Beehive Update 

# Cloud Auth Flow





 Sign In with Apple



 Sign in with Google



Beehive Update 

# Cloud Auth Flow

A central purple rounded rectangle representing the authentication flow. It contains:

- A circular logo with 'OAUTH' and a large 'A'.
- A button labeled 'Sign In with Apple' with an Apple logo.
- An emoji of a person in a red uniform and black hat, with a hand icon next to it.
- A button labeled 'Sign in with Google' with a Google 'G' logo.



Beehive Update 

# Cloud Auth Flow

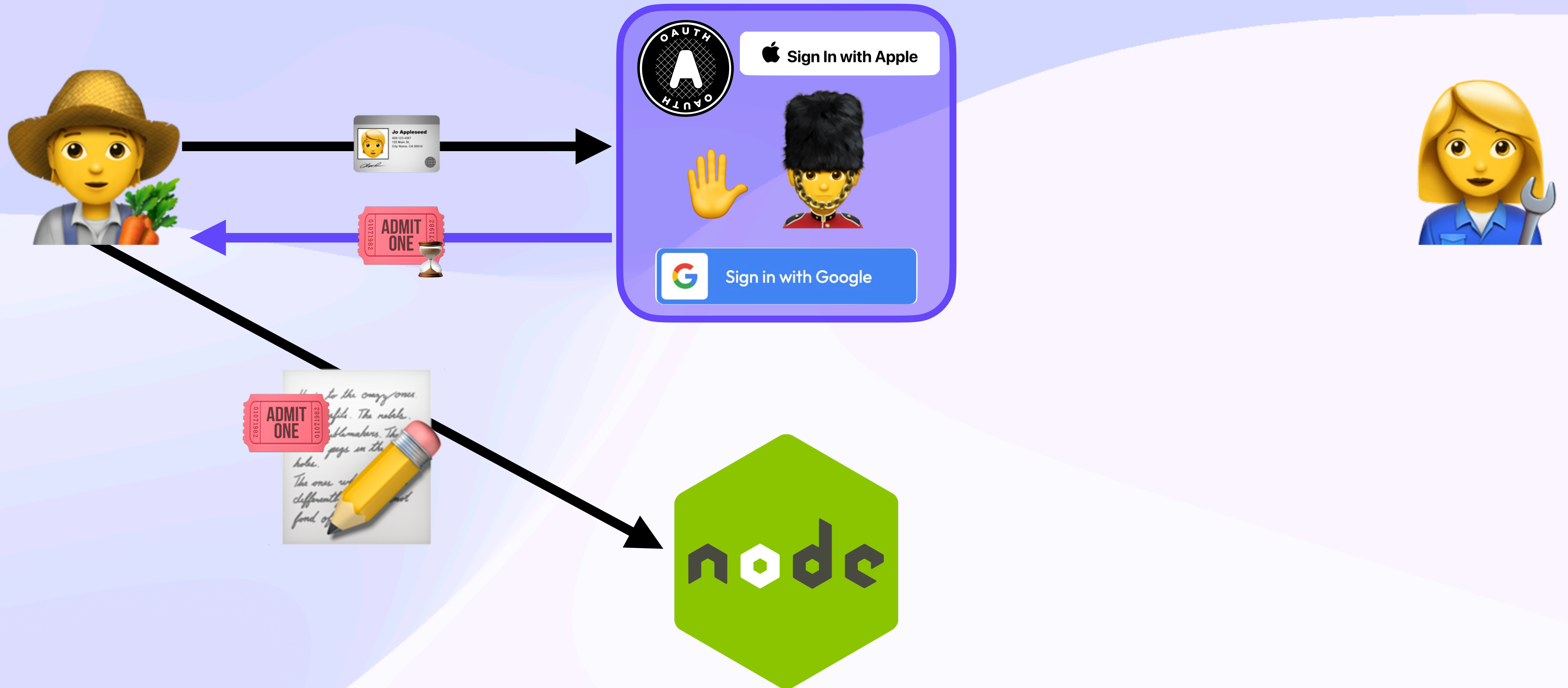


A central purple rounded rectangle representing the authentication flow. At the top left is a circular logo with 'OAUTH' and a large 'A'. At the top right is a button with the Apple logo and 'Sign In with Apple'. In the center is a hand emoji and a soldier emoji. At the bottom left is a button with the Google logo and 'Sign in with Google'.



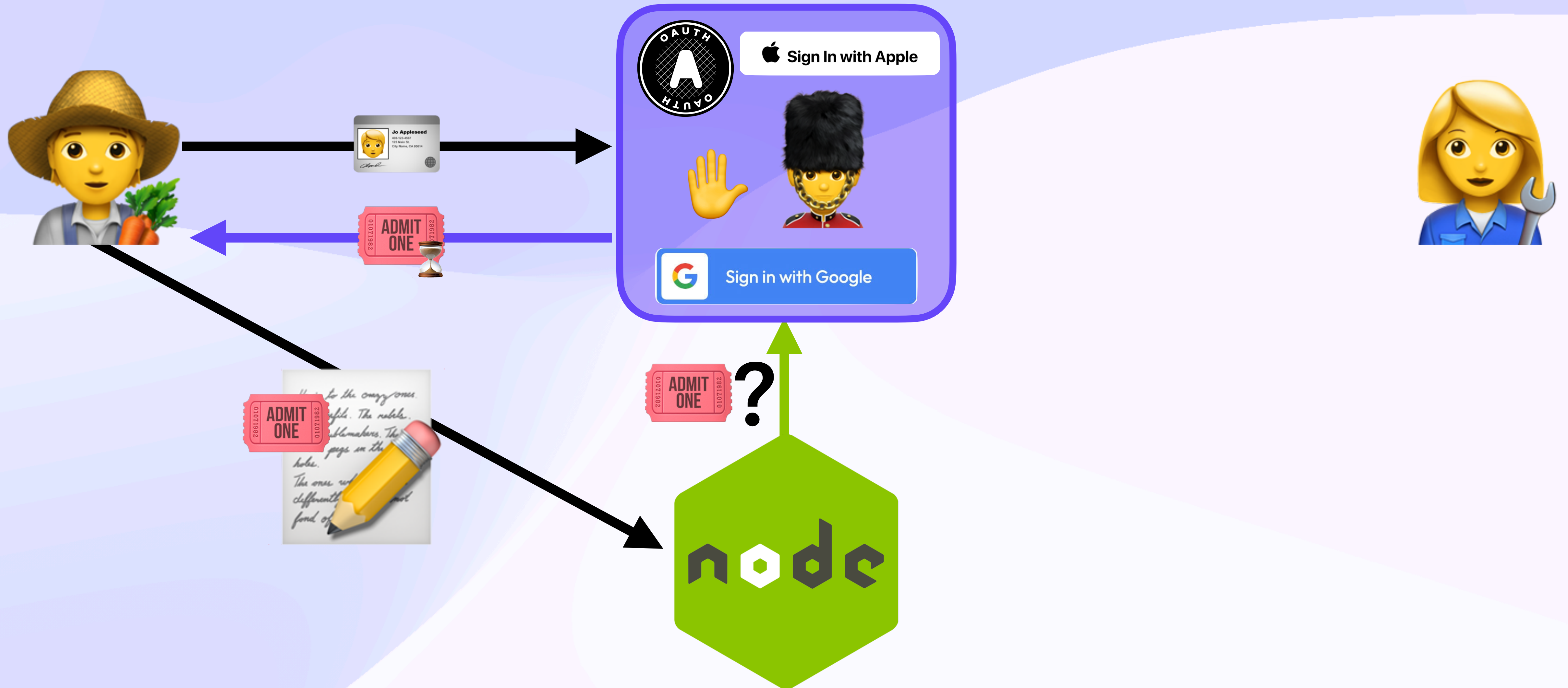
Beehive Update 

# Cloud Auth Flow



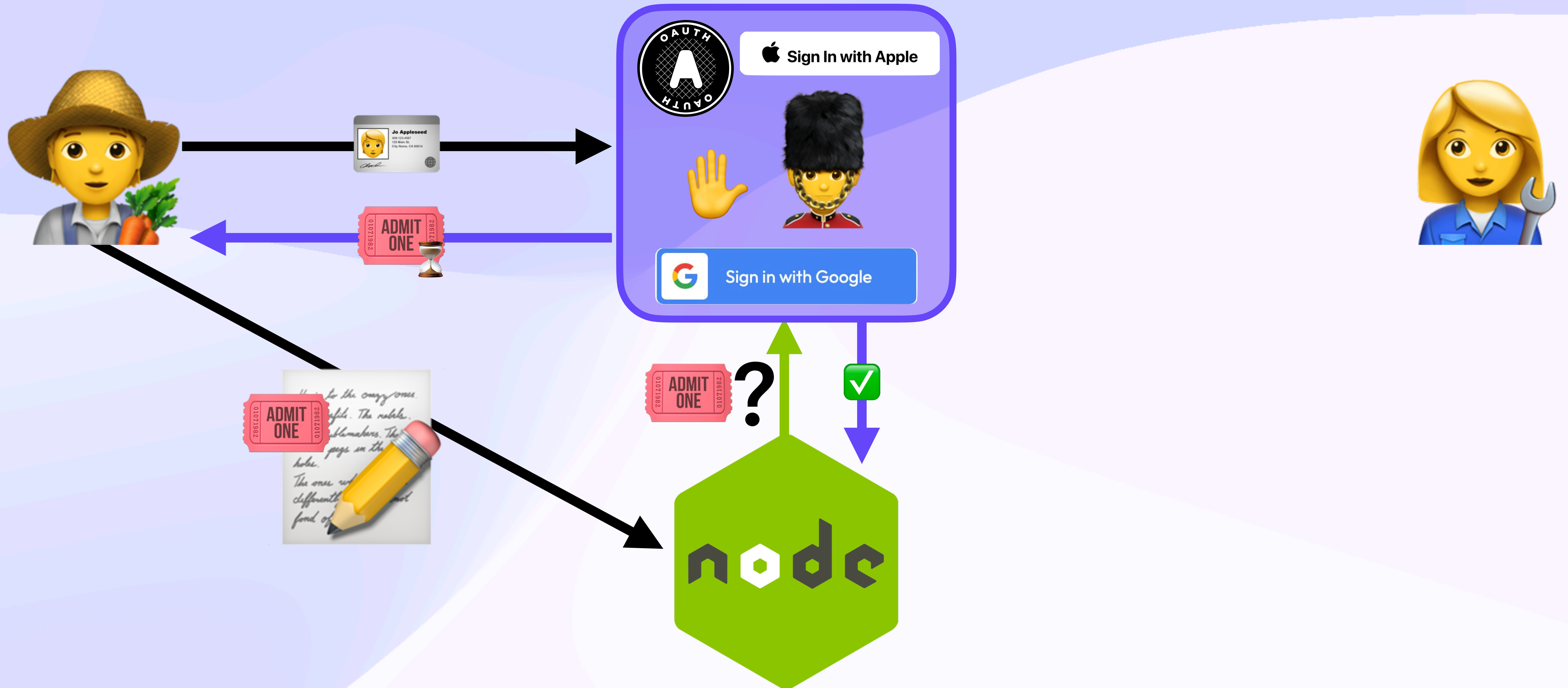
Beehive Update 

# Cloud Auth Flow



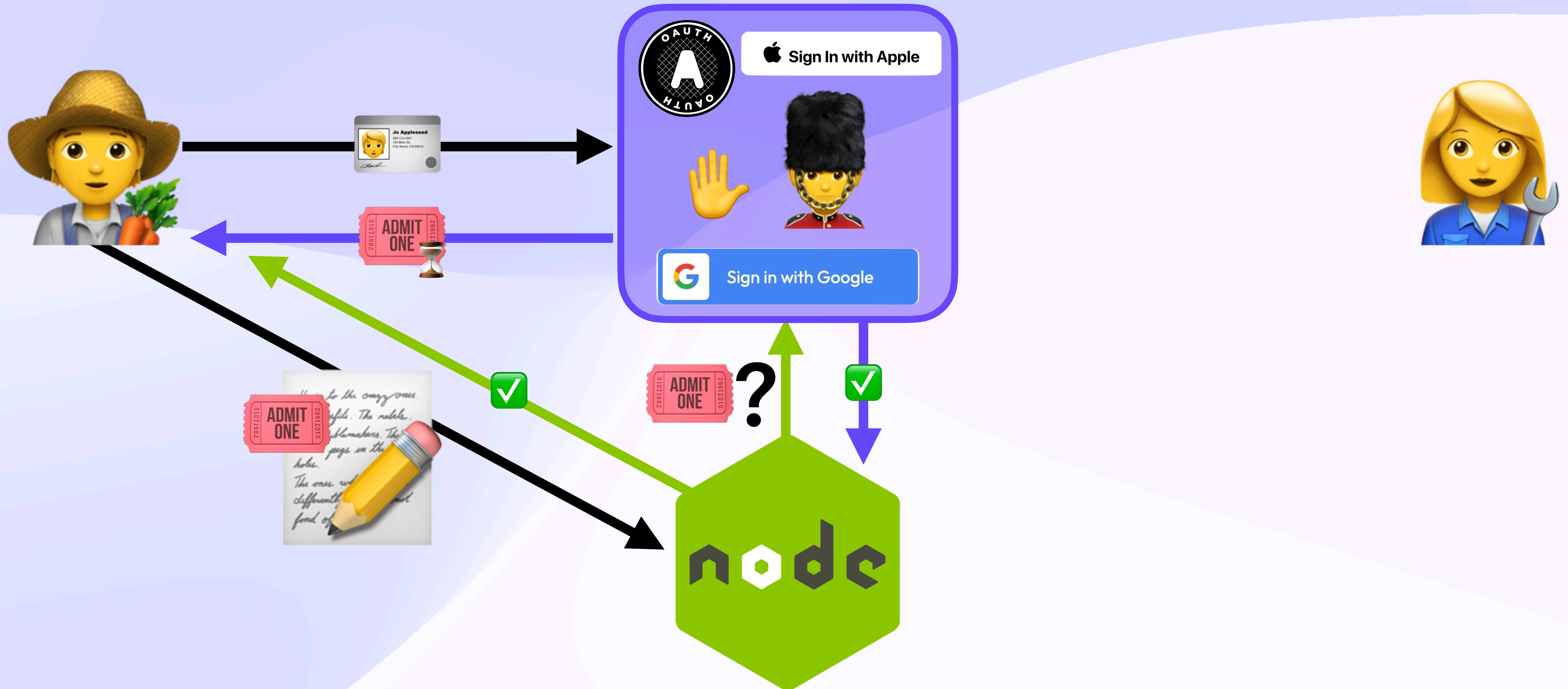
Beehive Update 

# Cloud Auth Flow



Beehive Update 

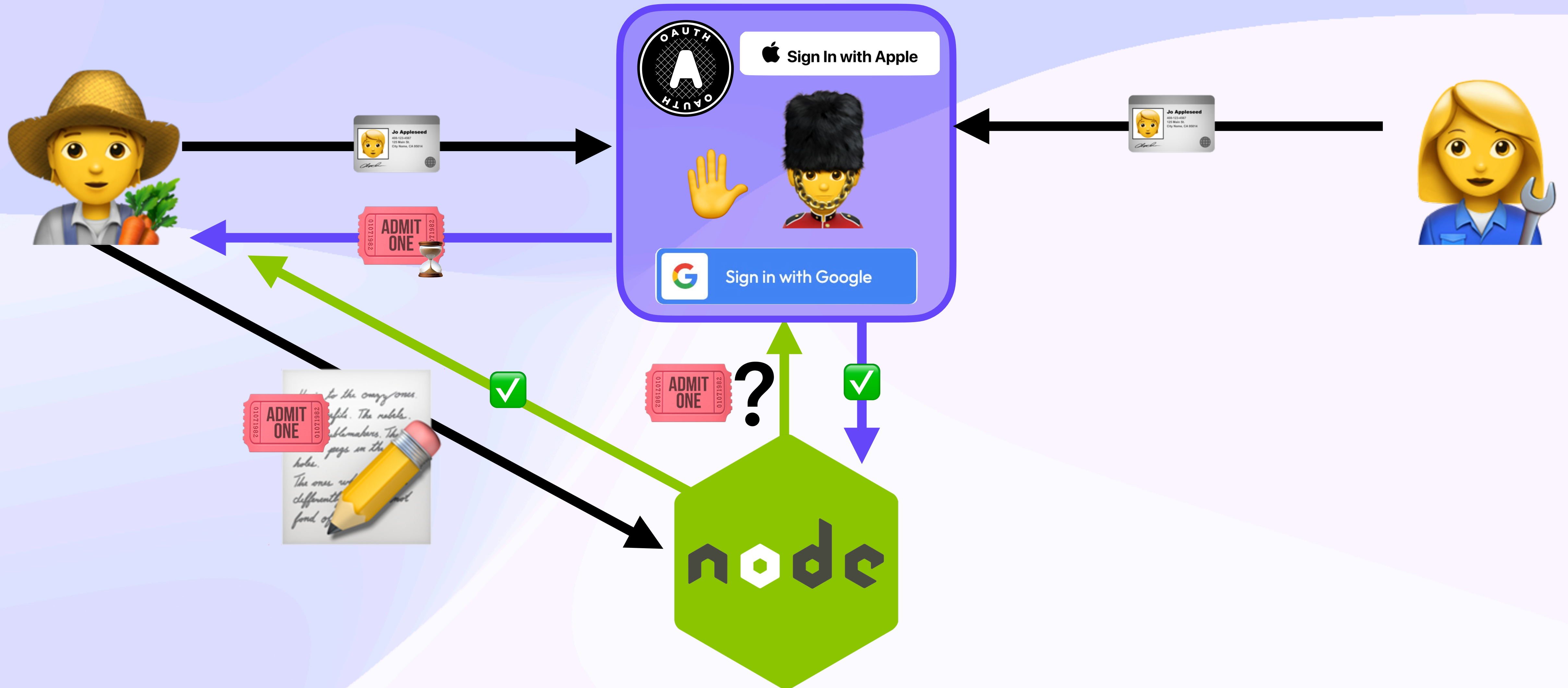
# Cloud Auth Flow





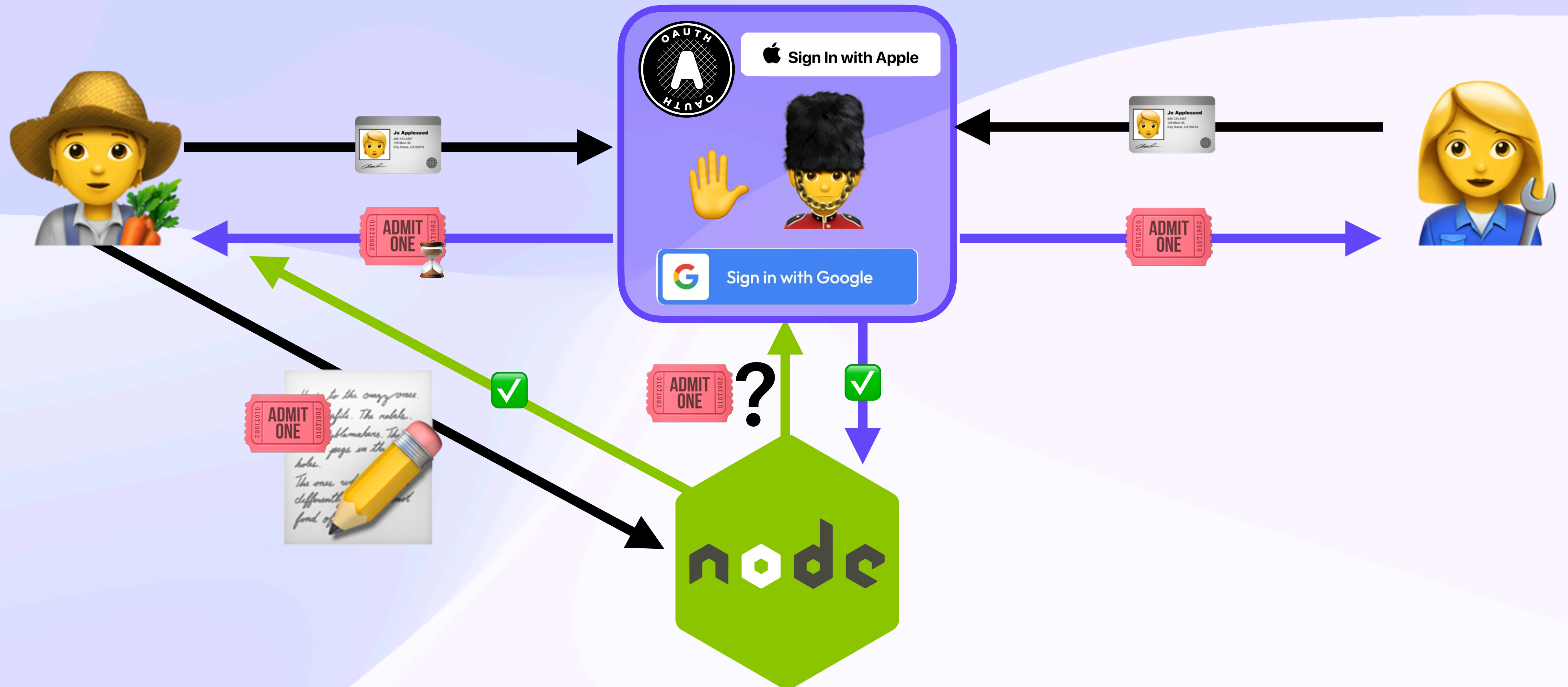
# Beehive Update

## *Cloud Auth Flow*



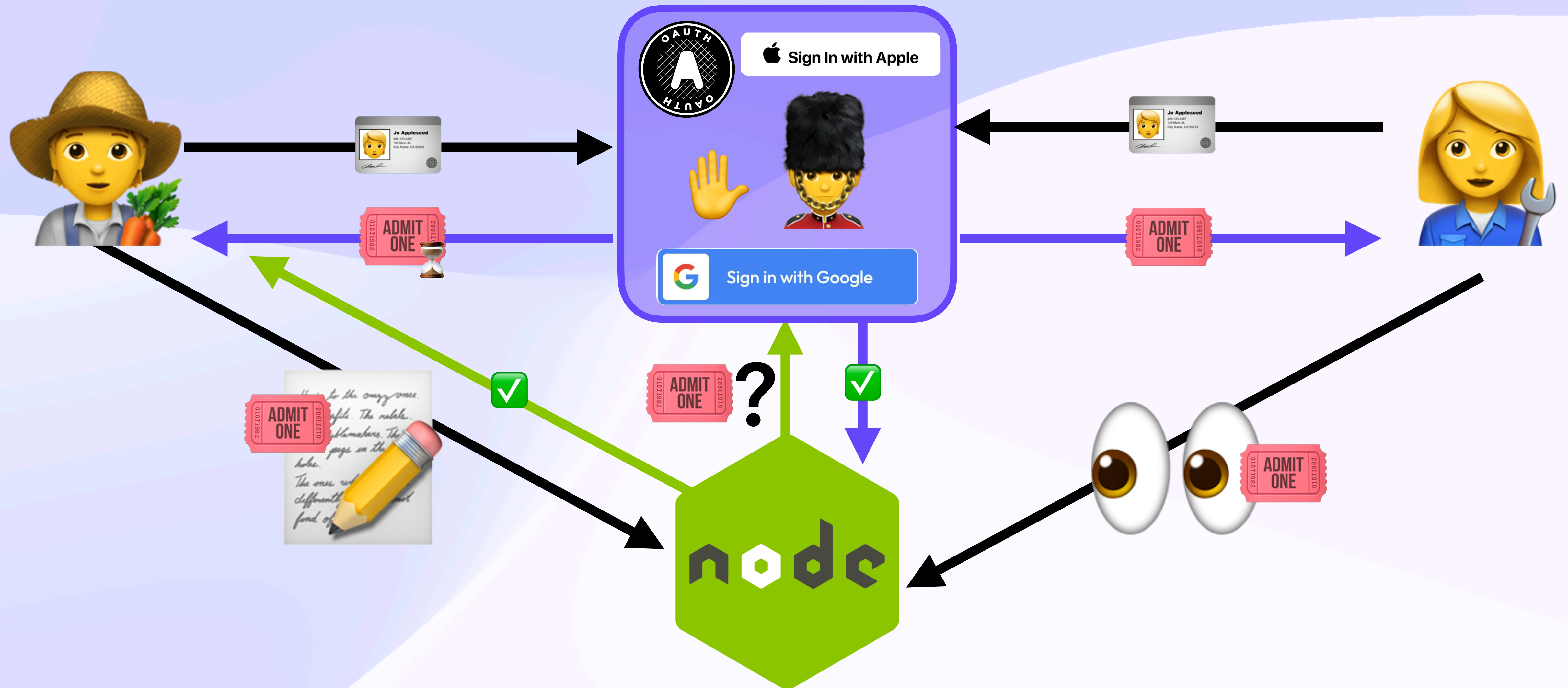
Beehive Update 

# Cloud Auth Flow



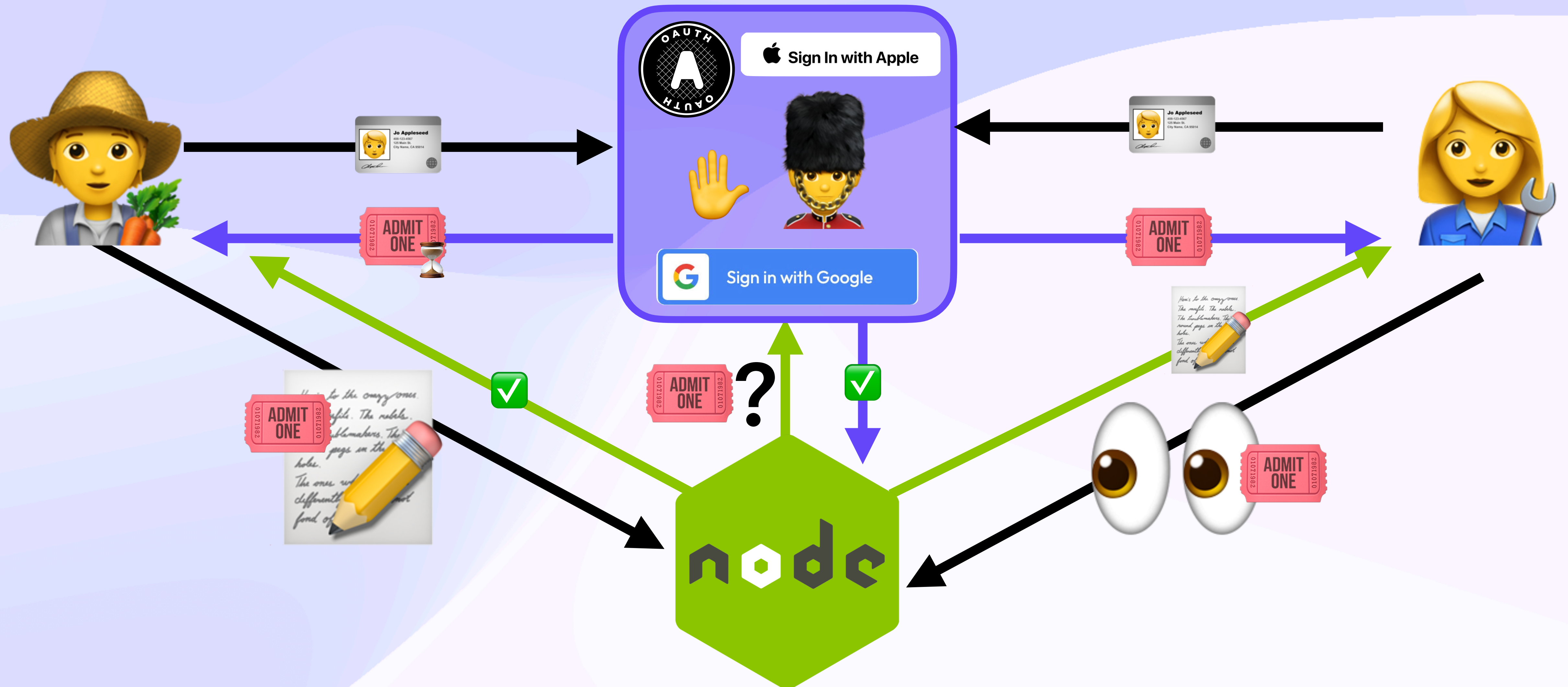
Beehive Update 

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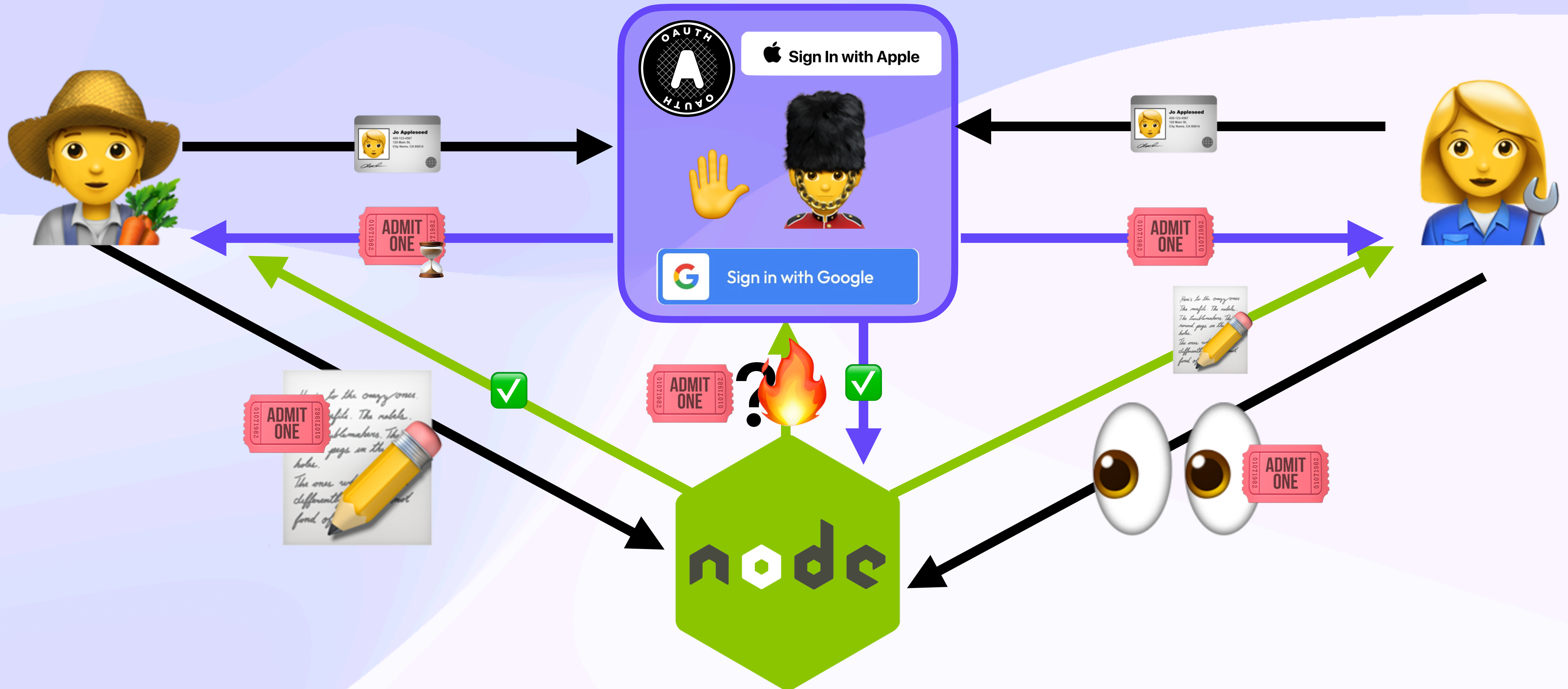
Beehive Update 

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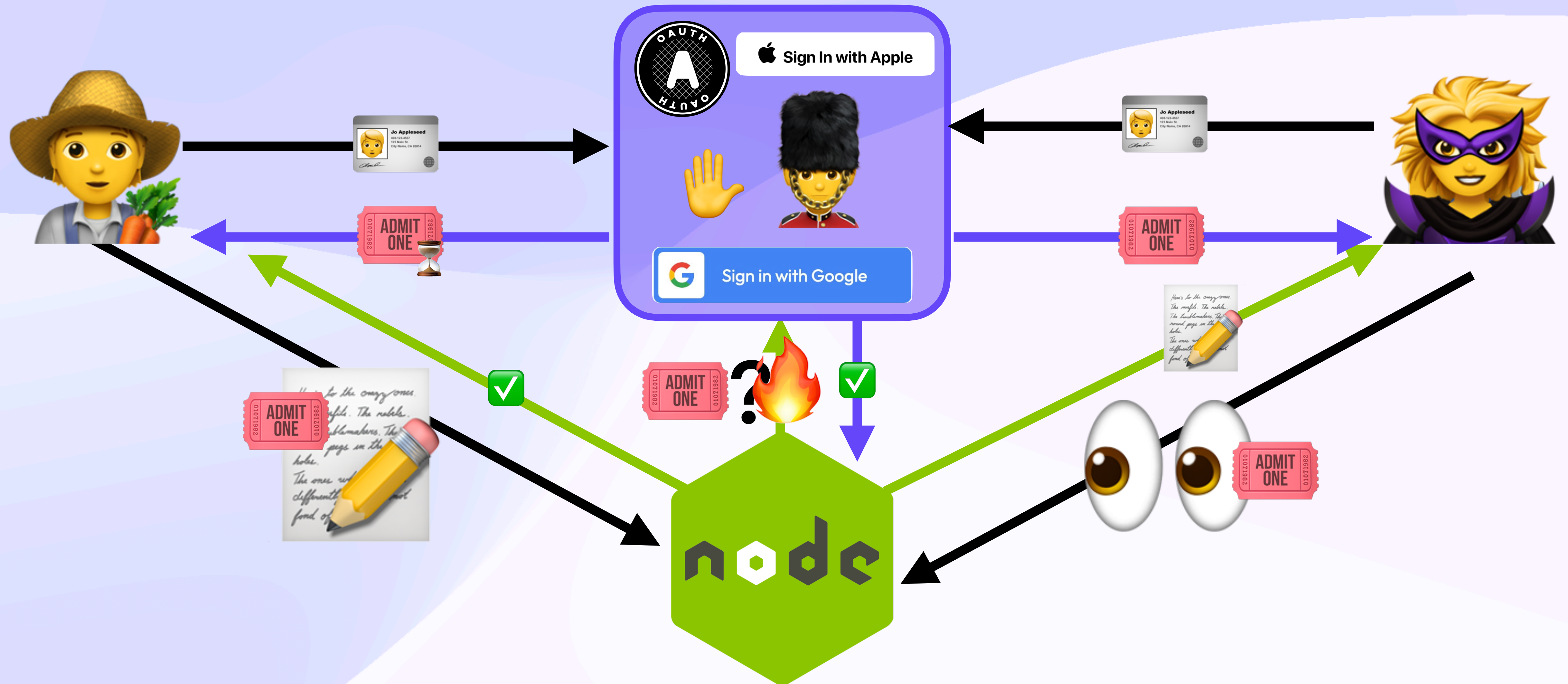
# Beehive Update

# Cloud Auth Flow



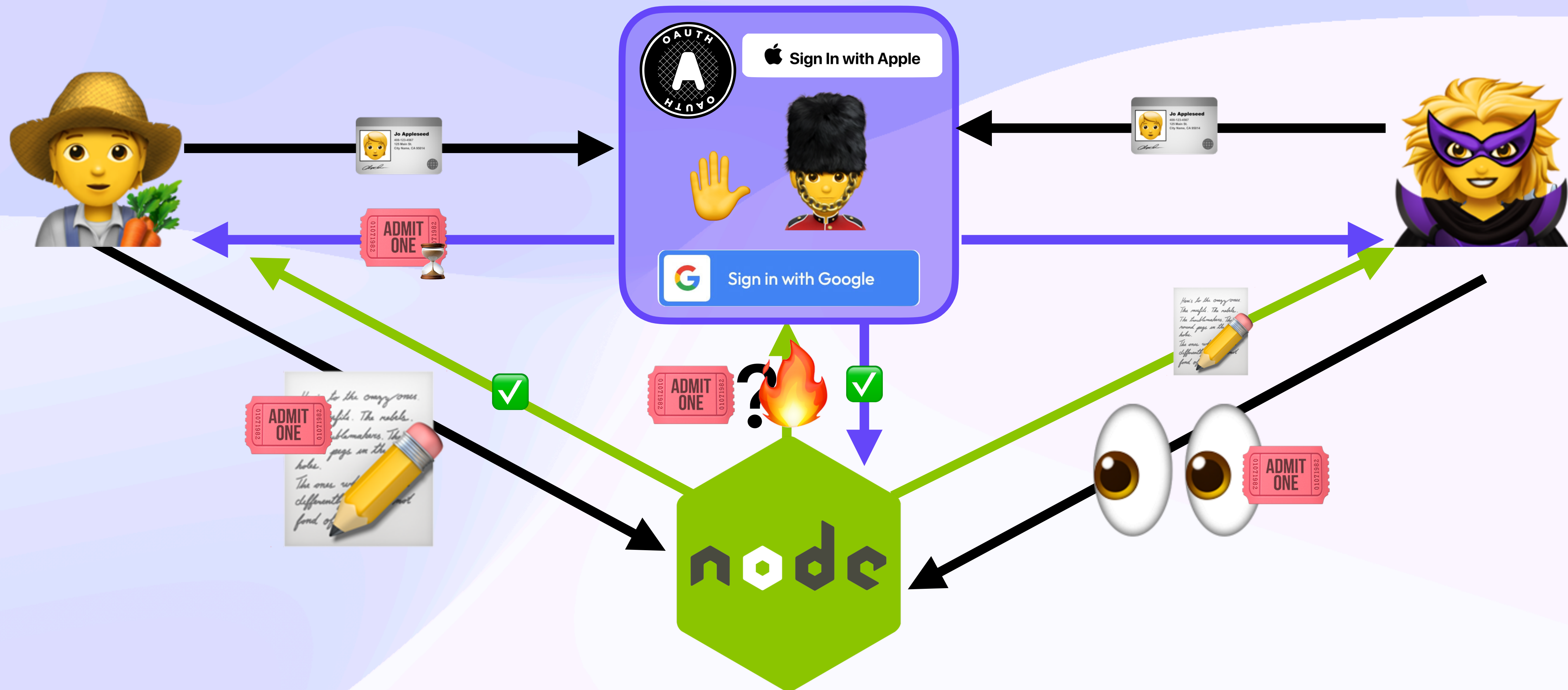
# Beehive Update

## Cloud Auth Flow



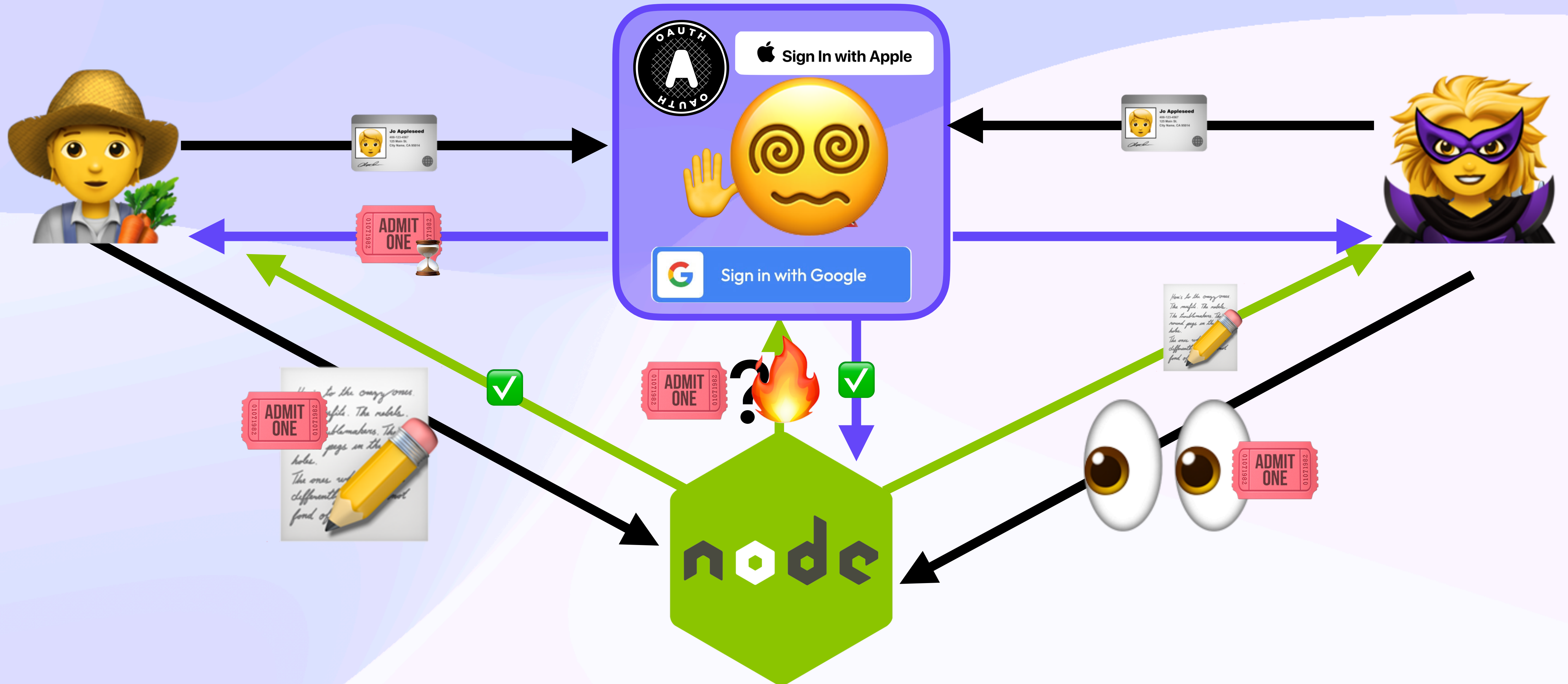
Beehive Update 

# Cloud Auth Flow




Beehive Update 

# Cloud Auth Flow





Beehive Update 

# ***Cloud: Auth-as-Place***

Beehive Update 

# *Cloud: Auth-as-Place*



Beehive Update 

# Cloud: Auth-as-Place

"Over Here"



"Over There"



Beehive Update 

# Cloud: Auth-as-Place

"Over Here"



"Over There"



Beehive Update 

# ***Local-First: In Pictures***

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# ***Local-First: In Pictures***



Beehive Update 🐝

# Local-First: In Pictures



Beehive Update 

# ***Auth as Data: "Auth Must Travel with Data"***





Beehive Update 

# ***Auth as Data: "Auth Must Travel with Data"***



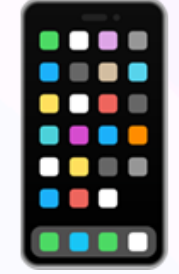
Beehive Update 

# ***Auth as Data: "Auth Must Travel with Data"***



Beehive Update 

# ***Auth as Data: "Auth Must Travel with Data"***



Beehive Update 

# ***Auth as Data: "Auth Must Travel with Data"***



# ***Auth as Data: "Auth Must Travel with Data"***

"Auth Here"  
"Data Here"



"Auth There"  
"Data There"



# ***Auth as Data: "Auth Must Travel with Data"***

"Auth Here"  
"Data Here"



"Auth There"  
"Data There"

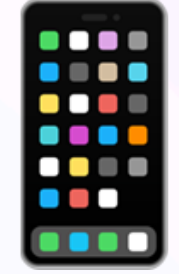
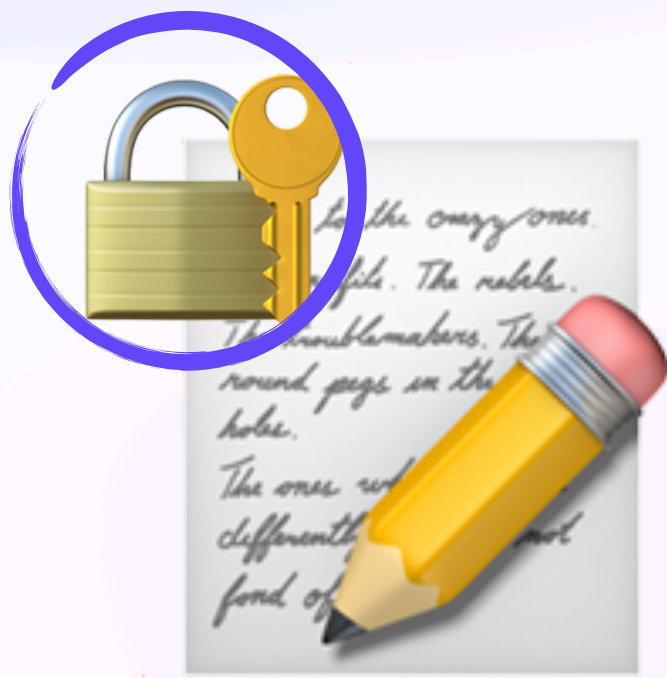


# ***Auth as Data: "Auth Must Travel with Data"***

"Auth Here"  
"Data Here"

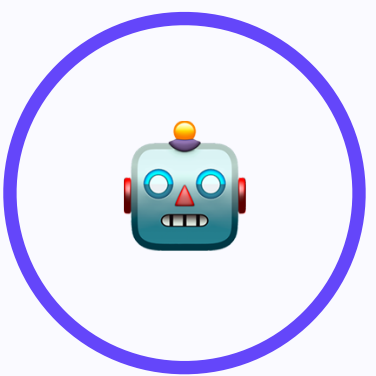
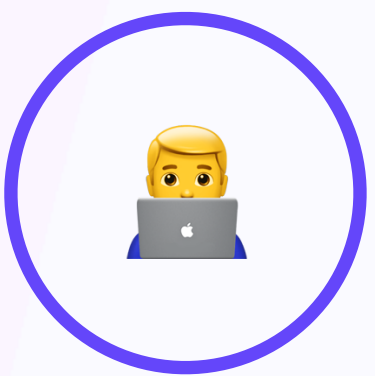
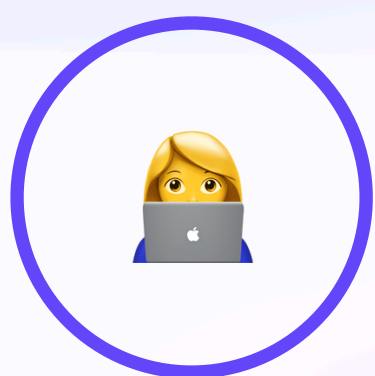
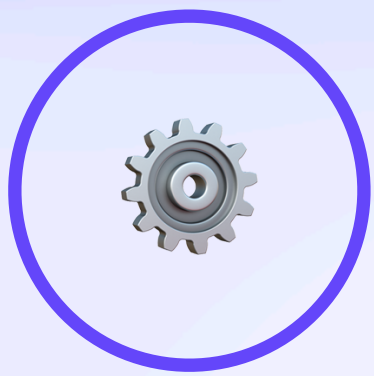
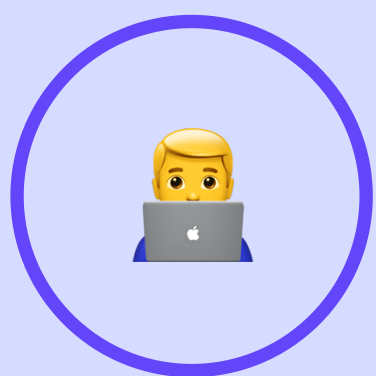
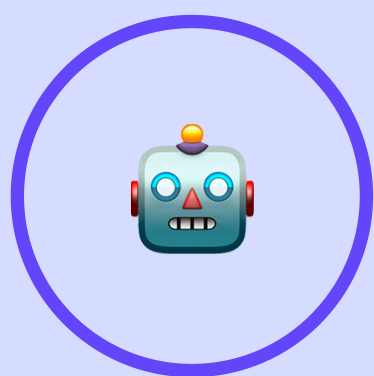


"Auth There"  
"Data There"



Beehive Update 

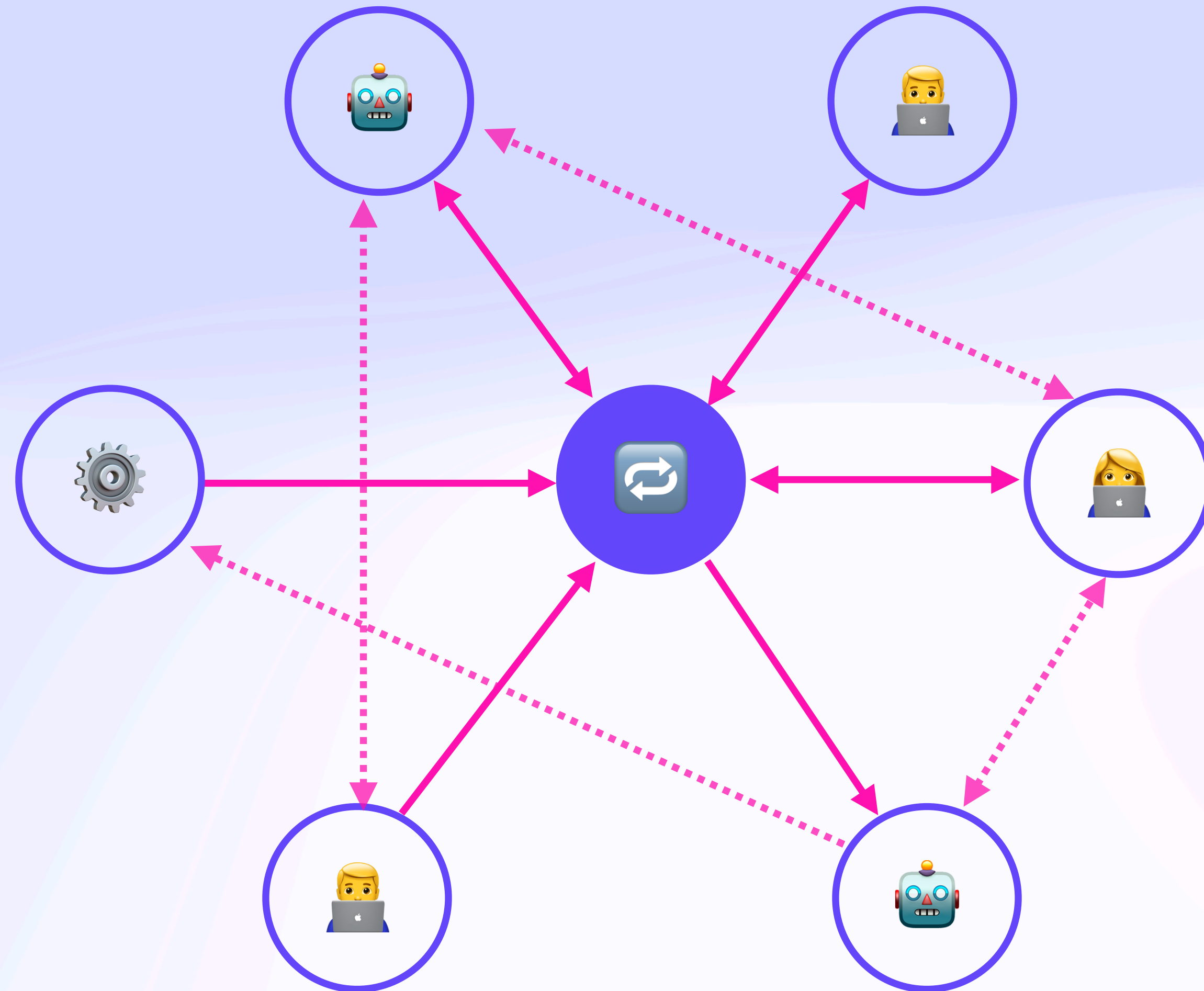
# Swappable Sync





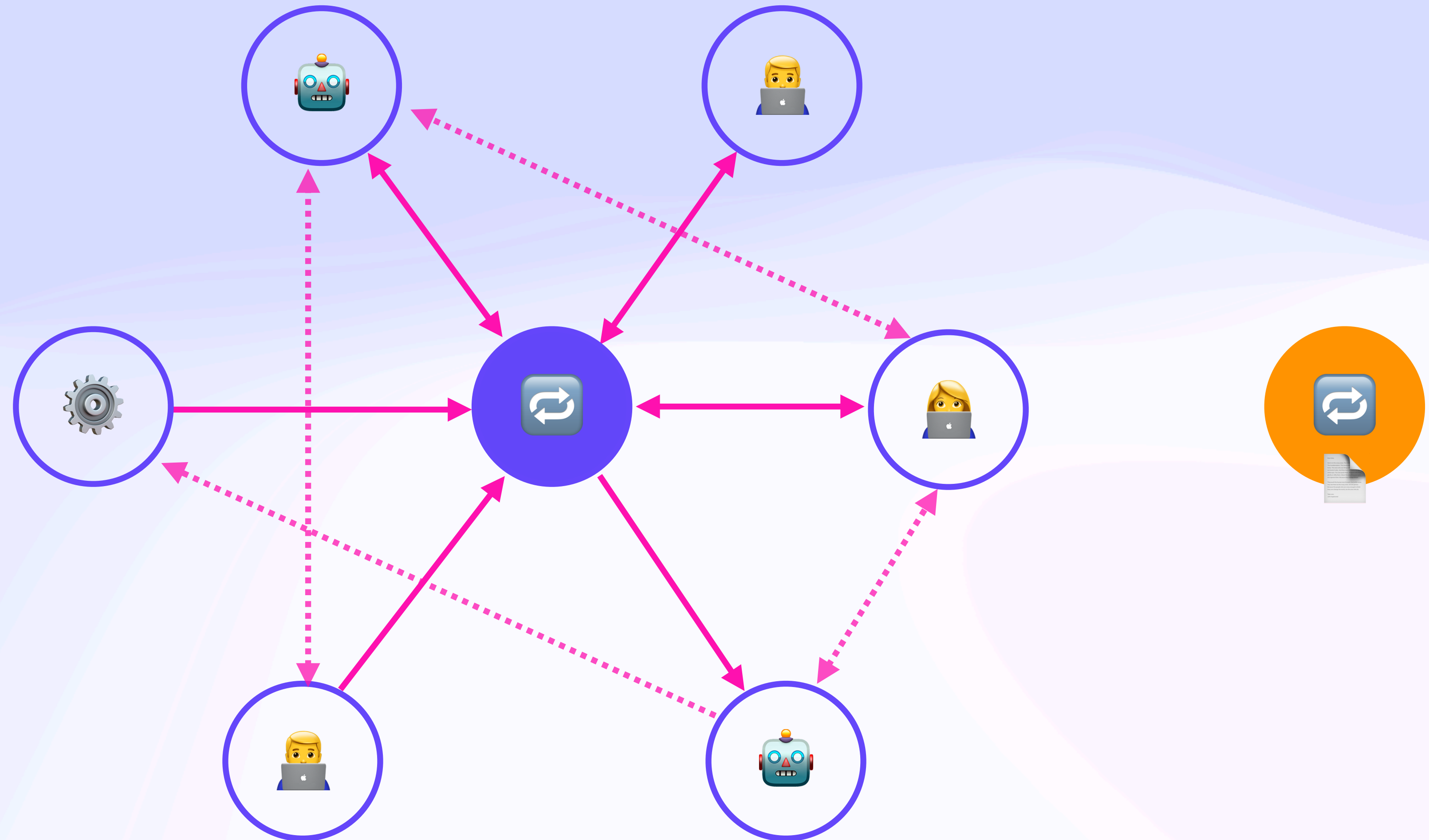
Beehive Update 

# Swappable Sync



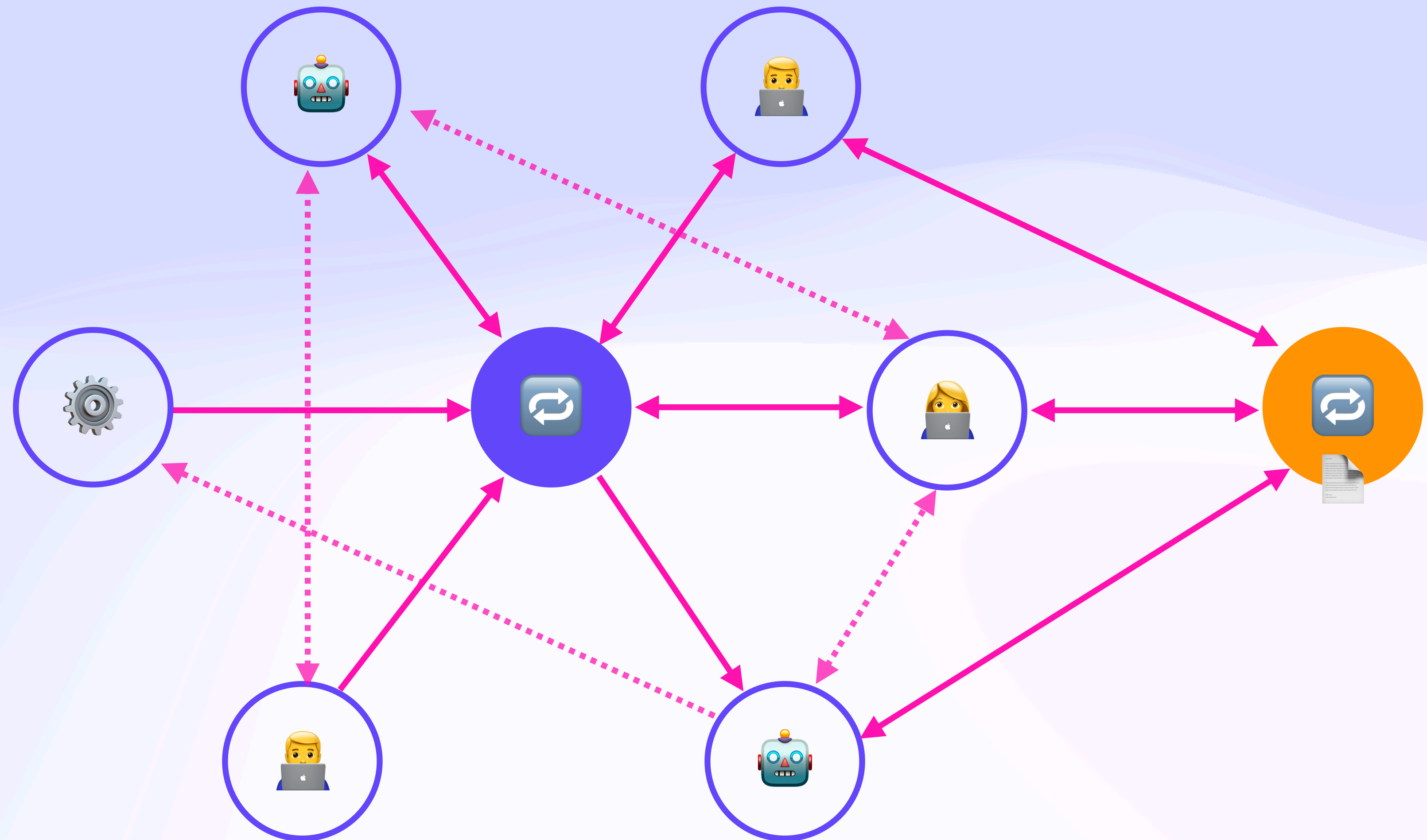
Beehive Update 

# Swappable Sync



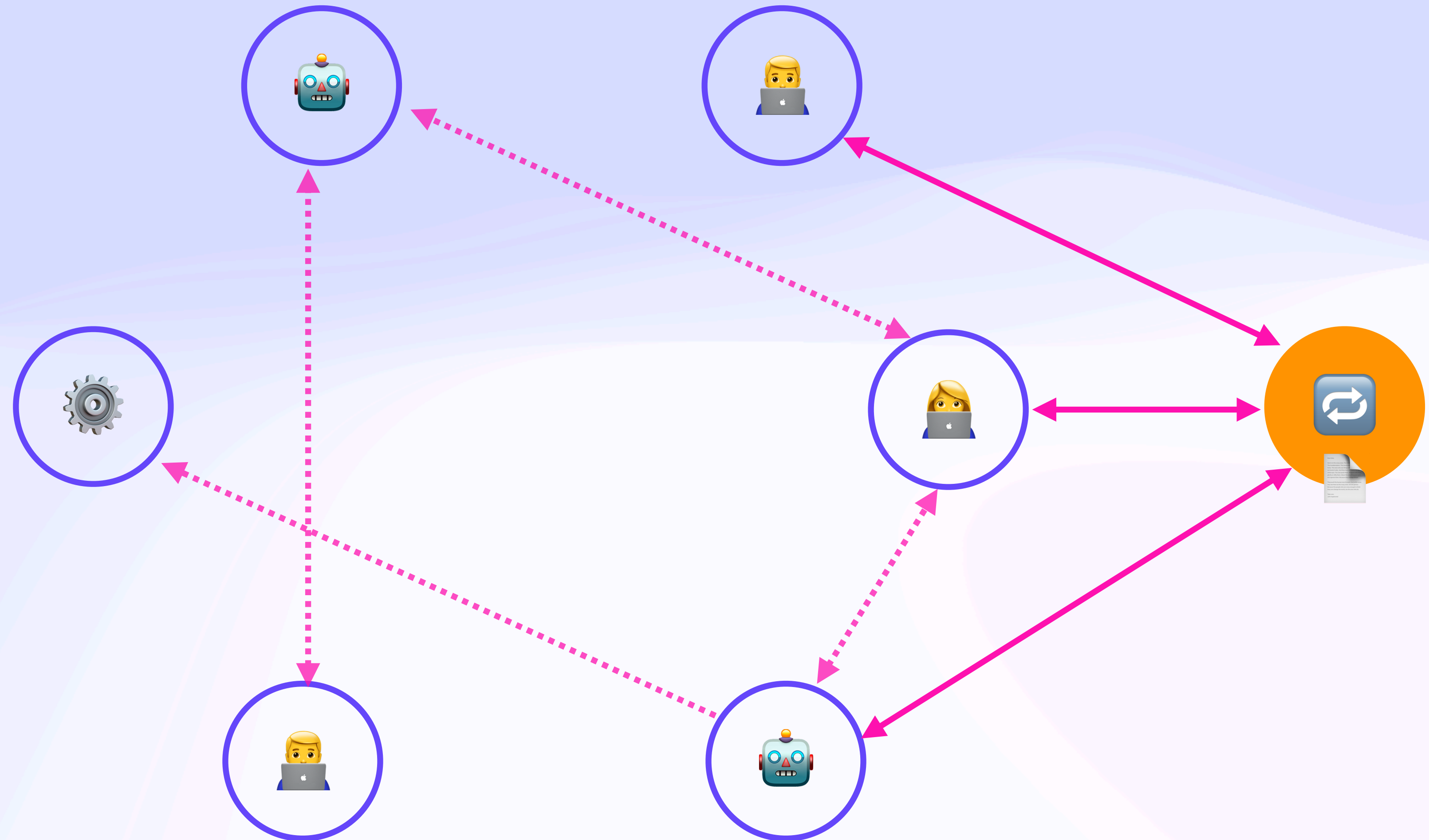
Beehive Update 


# Swappable Sync



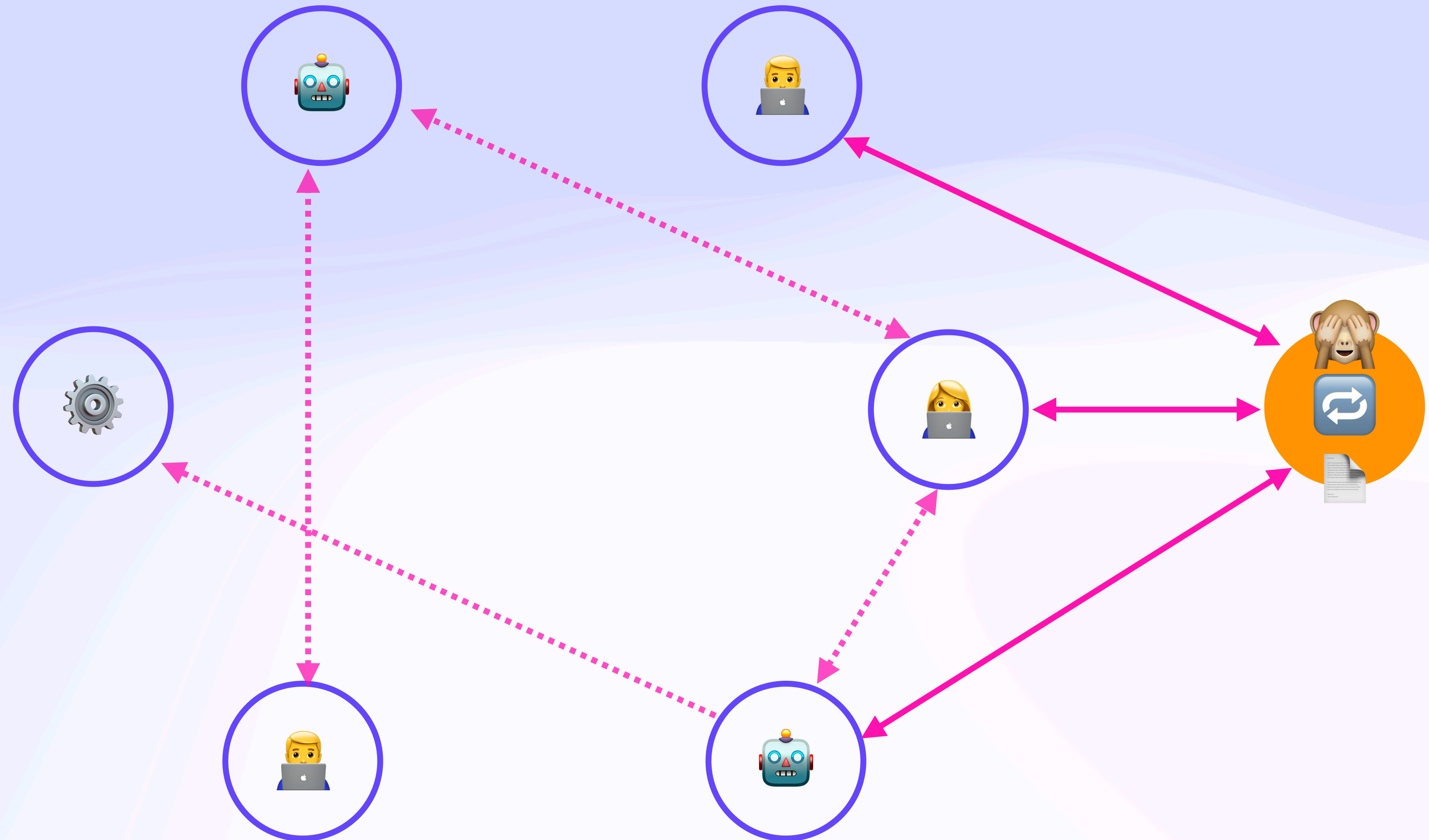
Beehive Update 

# Swappable Sync



Beehive Update 

# Swappable Sync



Auth vs Sync Server

***In Sync Servers We Trust (as little as possible)***

## Auth vs Sync Server

# *In Sync Servers We Trust (as little as possible)*

- What do we trust servers to do?
  - Hold our bytes and not delete them
  - Only send those bytes to someone with the right permissions
  - Trust them with the knowledge of our auth graph
    - Server knows who (IP address & public key) requests which doc IDs
- Defence-in-depth strategy against buggy or poorly run sync servers (or break-ins)

# Beehive Update





Beehive Update 

***Cloud***

***Local-First***

Beehive Update 

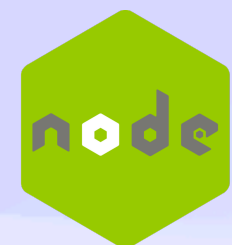
# Cloud


# Local-First

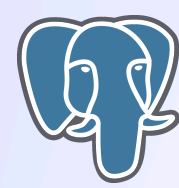
Auth 



Compute 




Data 

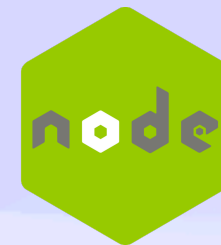



# Cloud

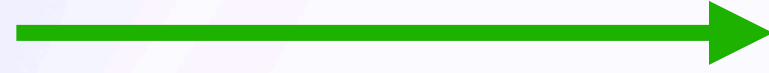
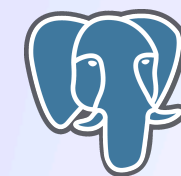
Auth 



Compute 




Data 





# Local-First


Compute 

Data 

# Cloud


Auth 


Compute 

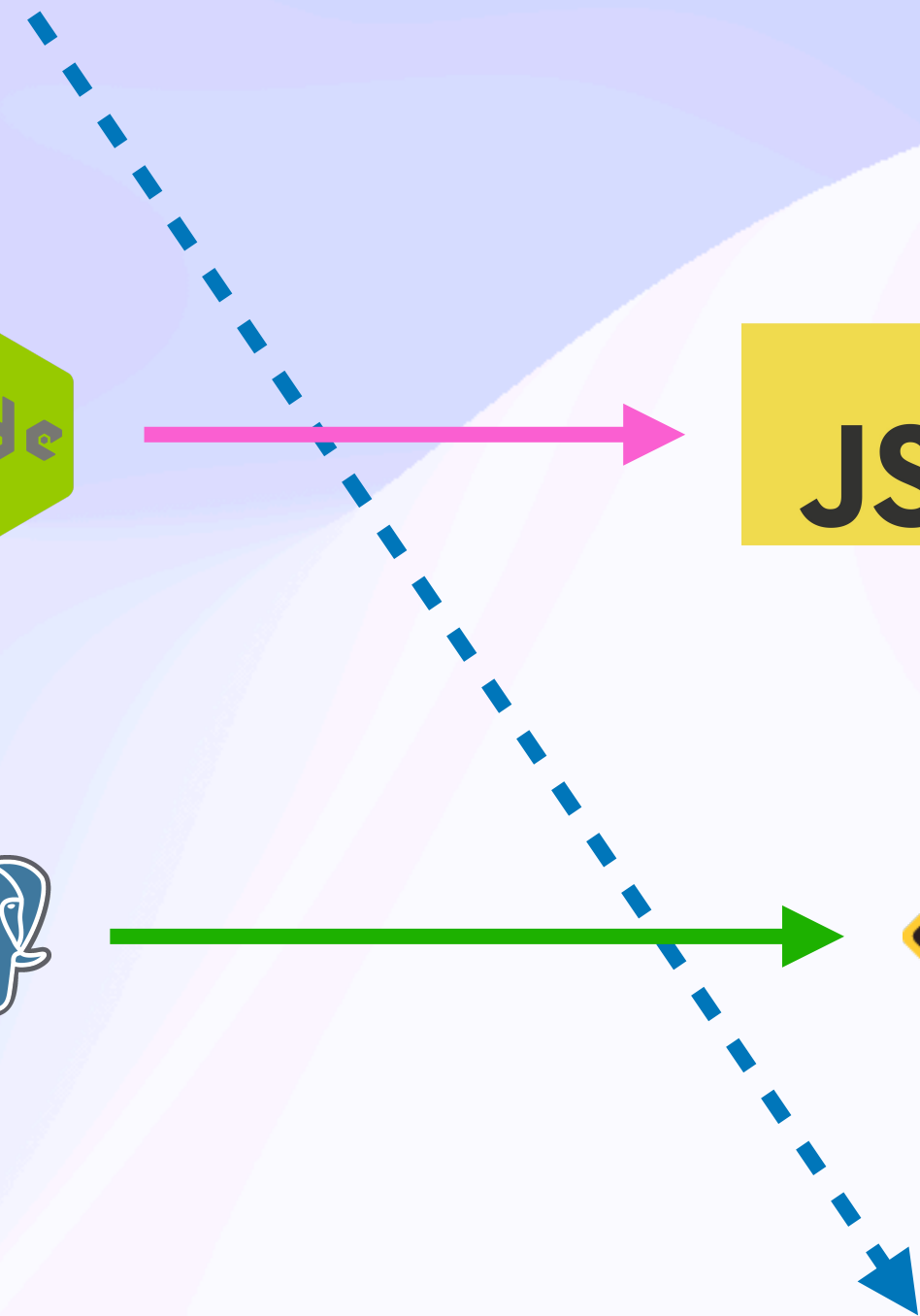
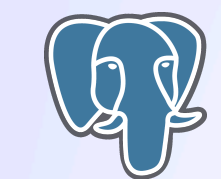
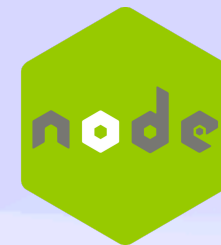
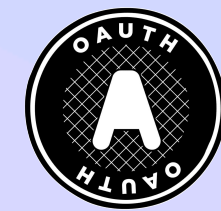
Data 

# Local-First

Compute 

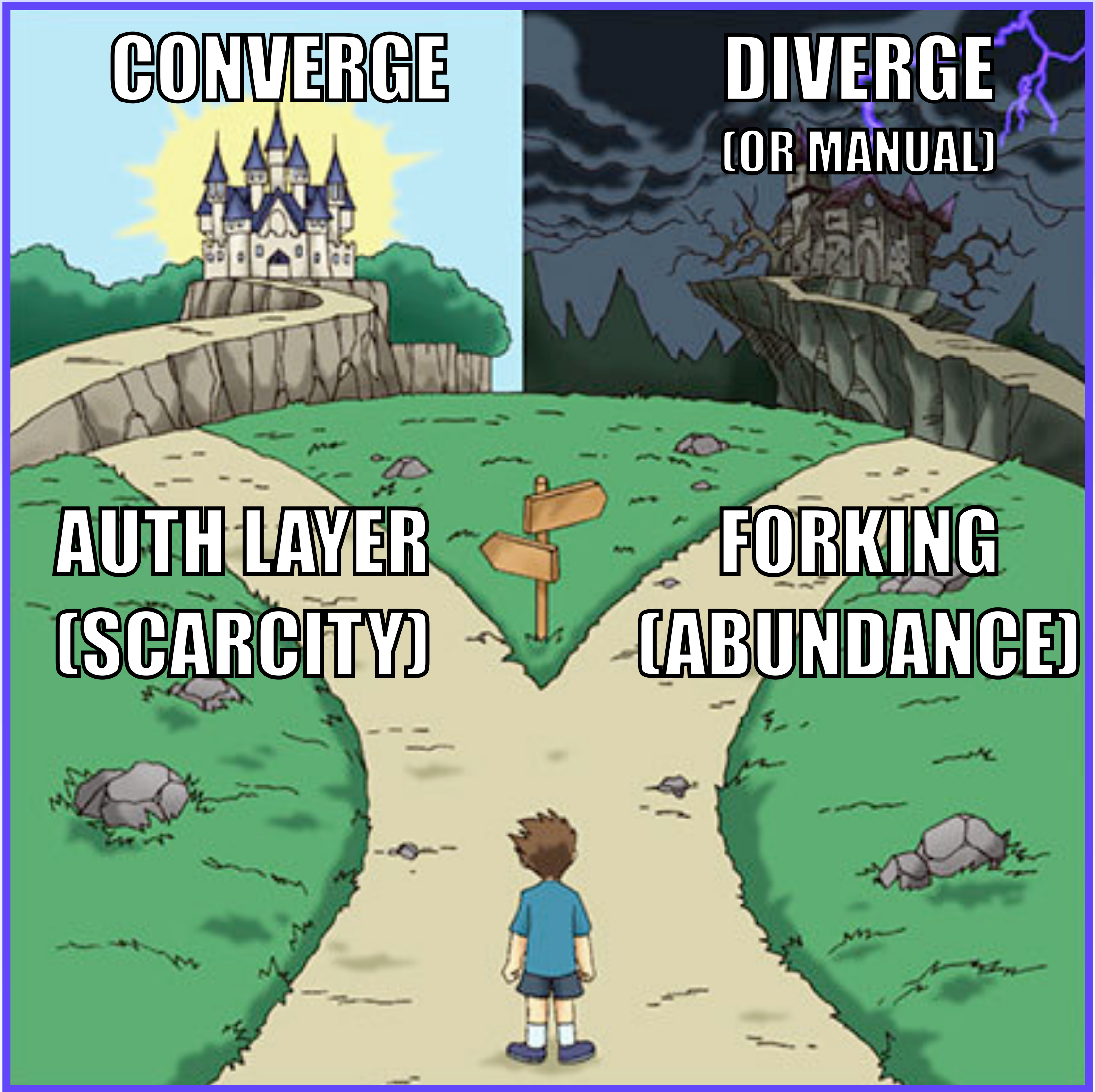
Data 

Auth 



Beehive Update 

# *Automatic Merging With Scarcity*



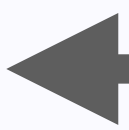
Beehive Update 

# ***Auth Levels***

# Beehive Update

## **Auth Levels**

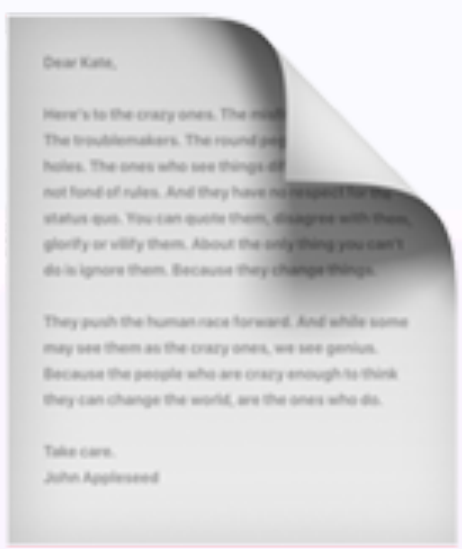
Copy  
(Request)



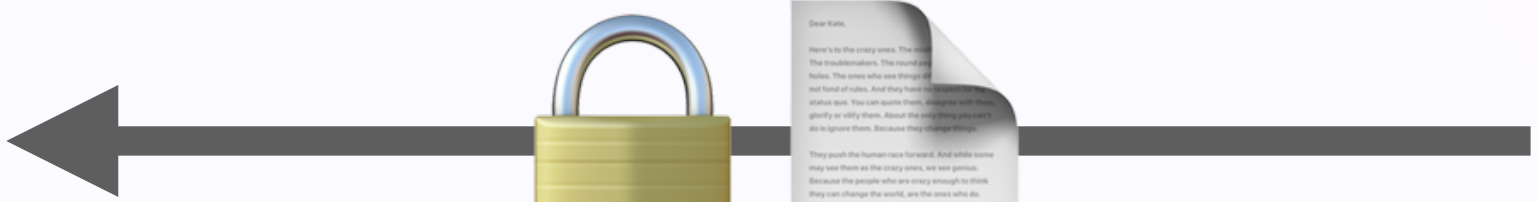
Beehive Update 

# Auth Levels

Read  
(Decrypt)



Copy  
(Request)

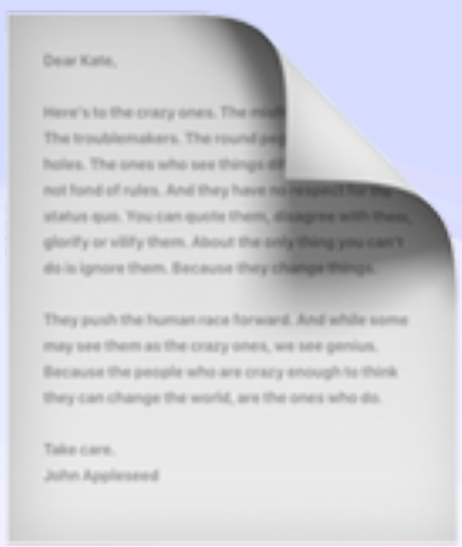
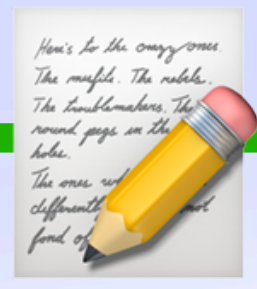
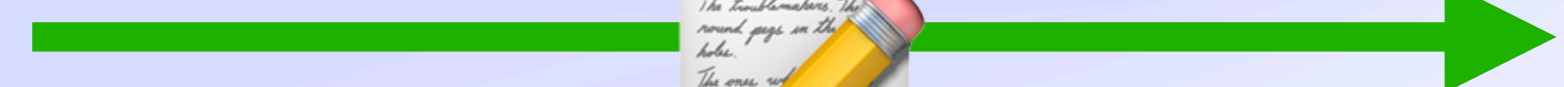




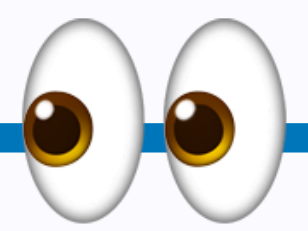
# Beehive Update

## **Auth Levels**

Write  
(Update)



Read  
(Decrypt)



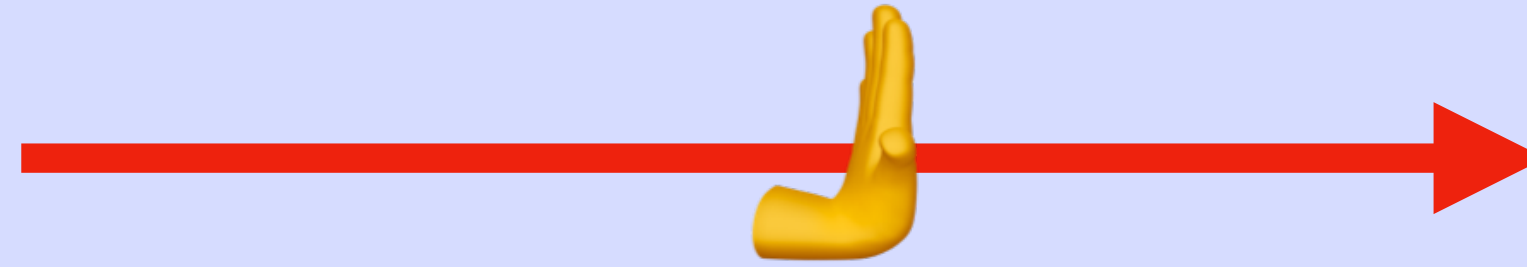
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(Request)



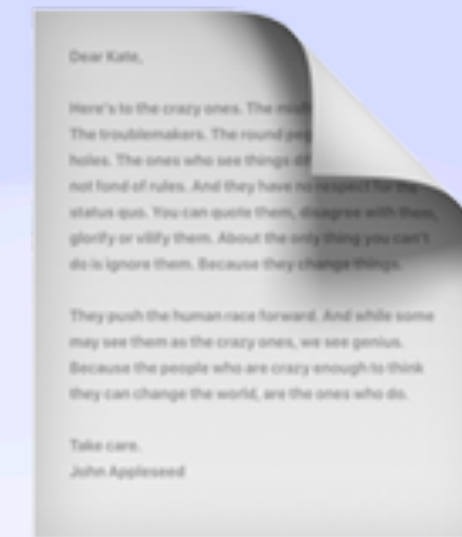
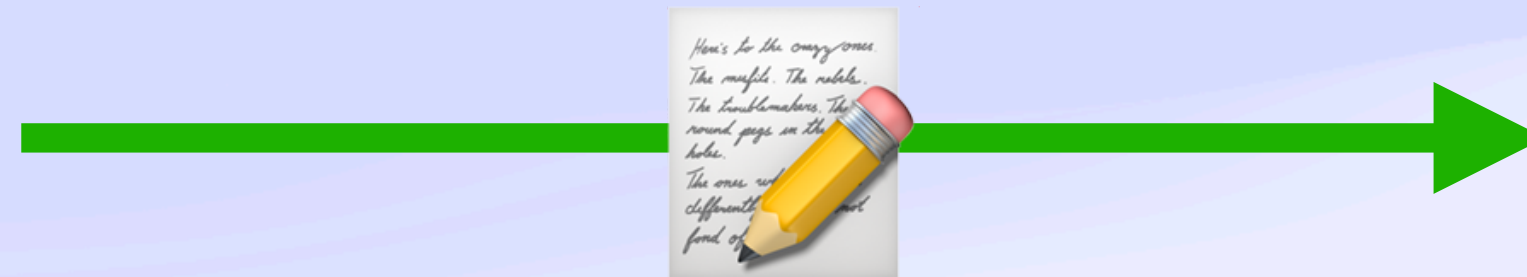
# Beehive Update

## **Auth Levels**

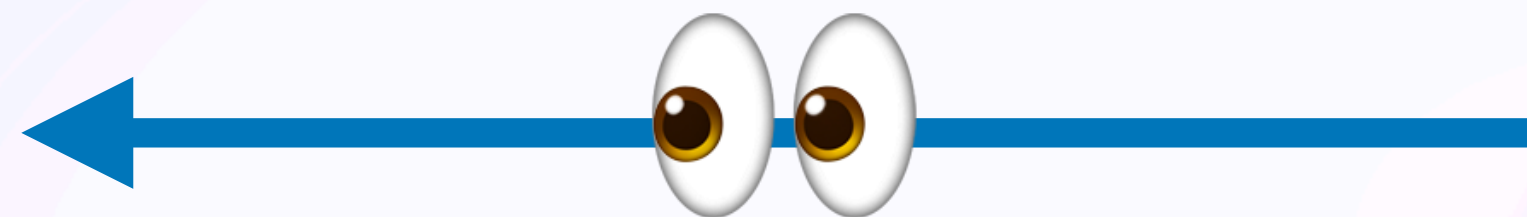
Admin  
(Revoke)



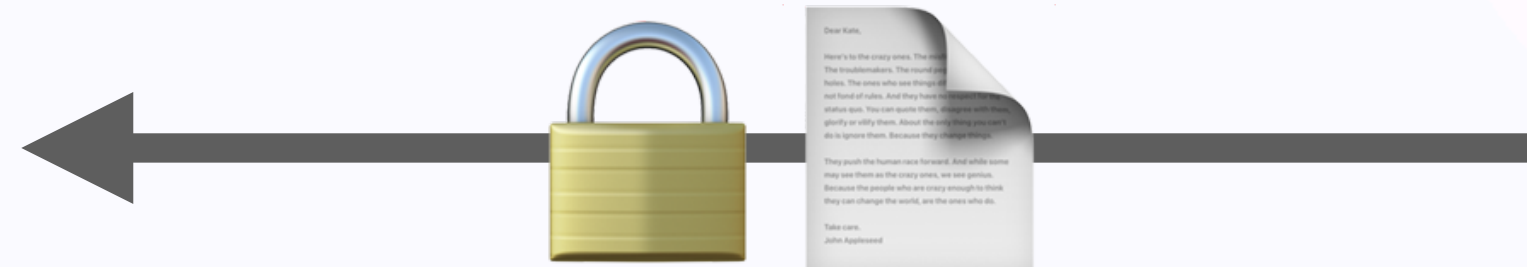
Write  
(Update)



Read  
(Decrypt)



Copy  
(Request)

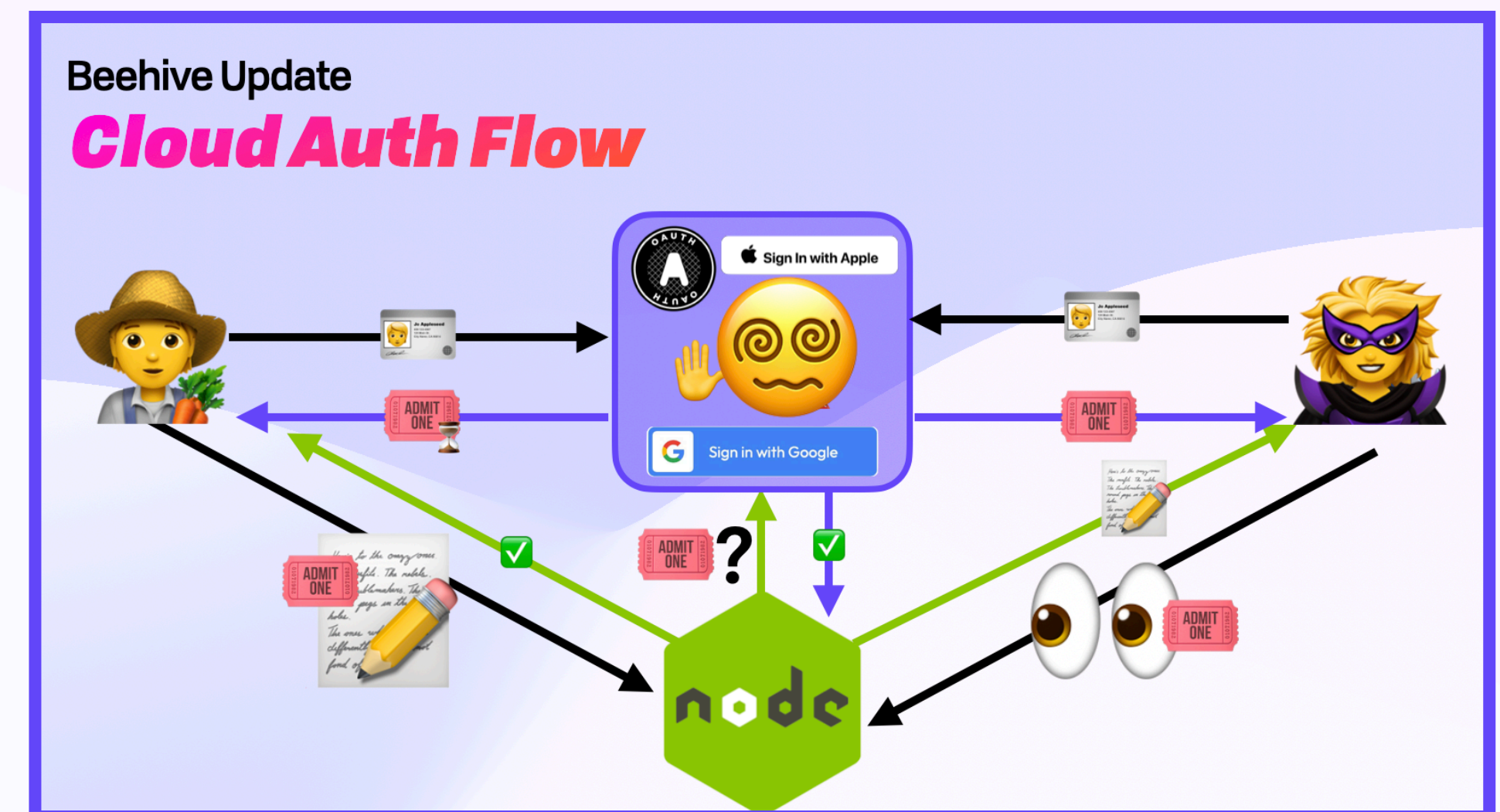


Beehive Update 

# ***Self-Authenticating Changes***

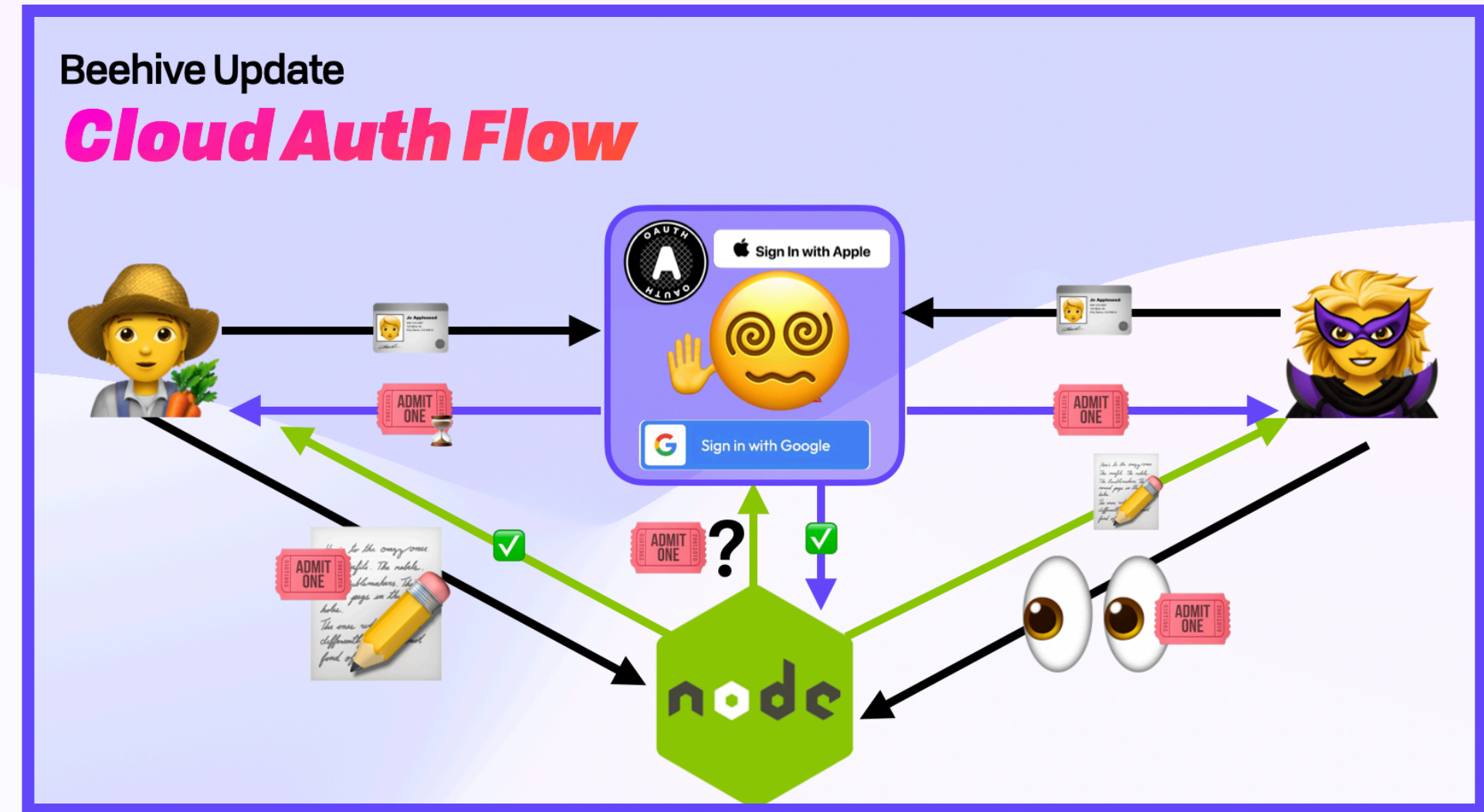
Beehive Update 

# Self-Authenticating Changes



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# Self-Authenticating Changes



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# Self-Authenticating Changes

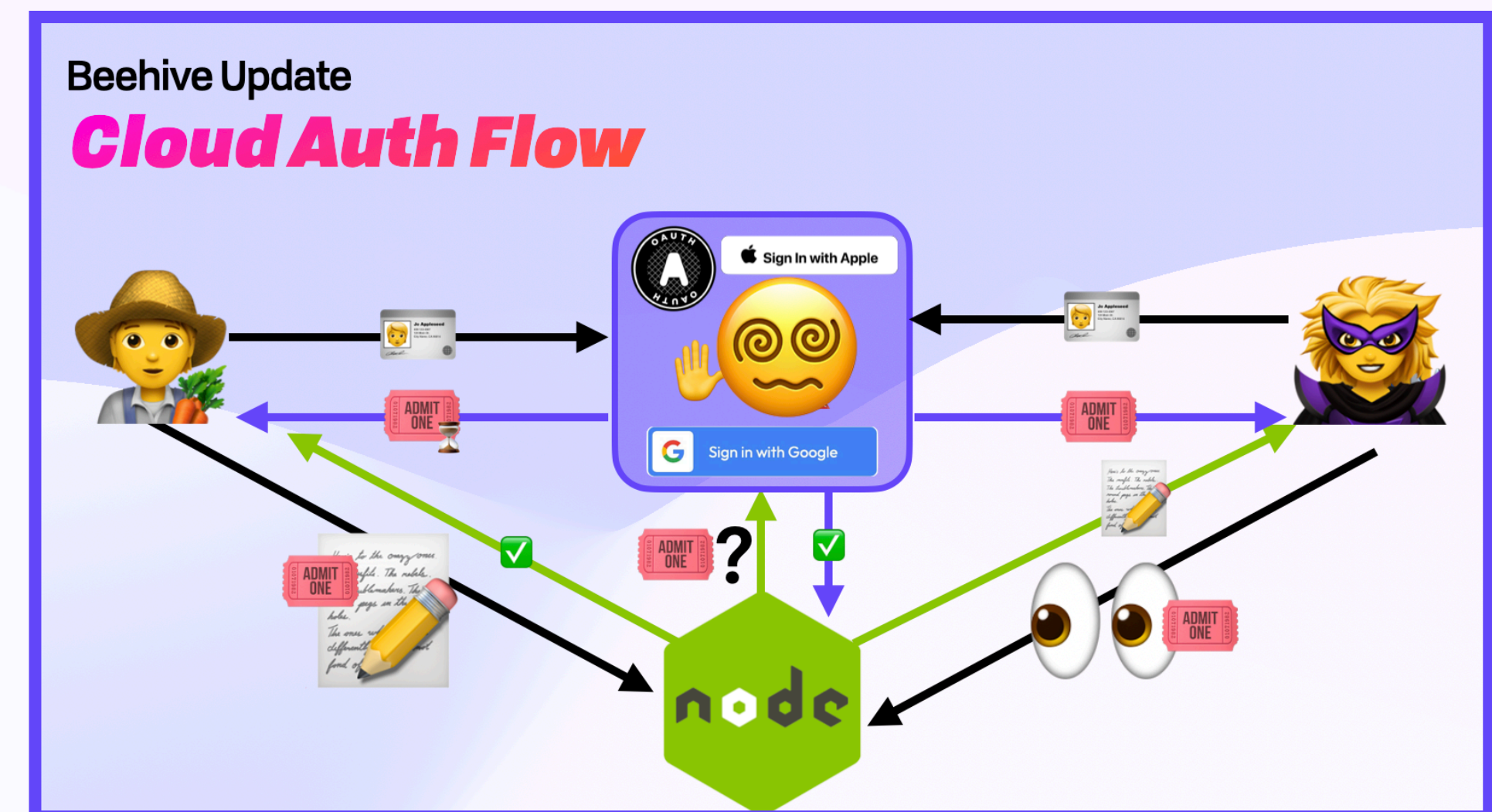


Dear Kate,

Here's to the crazy ones. The misfits. The troublemakers. The round pegs in a square hole. The ones who see things that not fond of rules. And they have no sense of status quo. You can quote them, disagree with them, glorify or vilify them. About the only thing you can't do is ignore them. Because they change things.

They push the human race forward. And while some may see them as the crazy ones, we see genius. Because the people who are crazy enough to think they can change the world, are the ones who do.

Take care,  
John Appleseed



# Beehive Update

# Self-Authenticating Changes

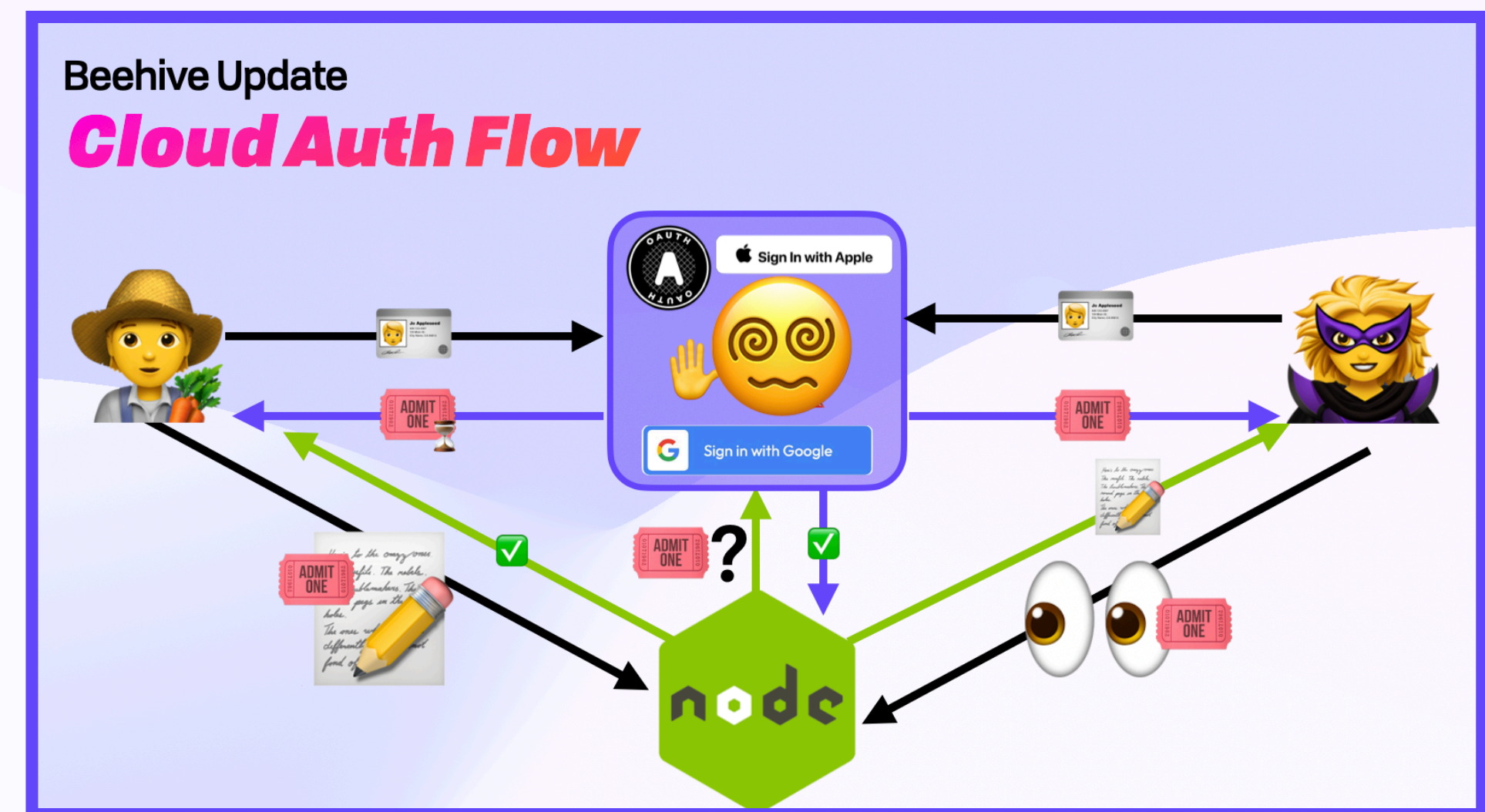


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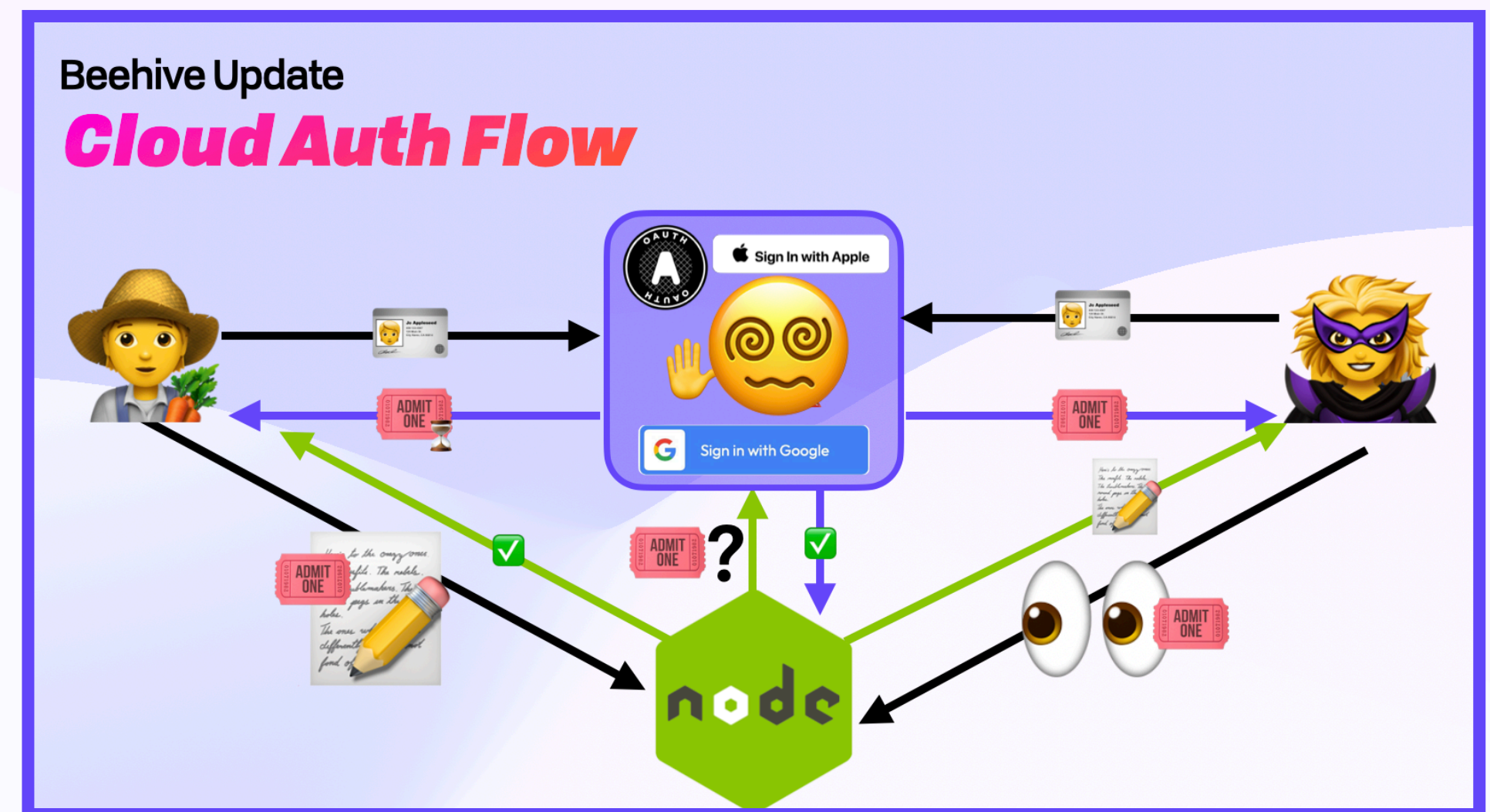
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# Self-Authenticating Changes



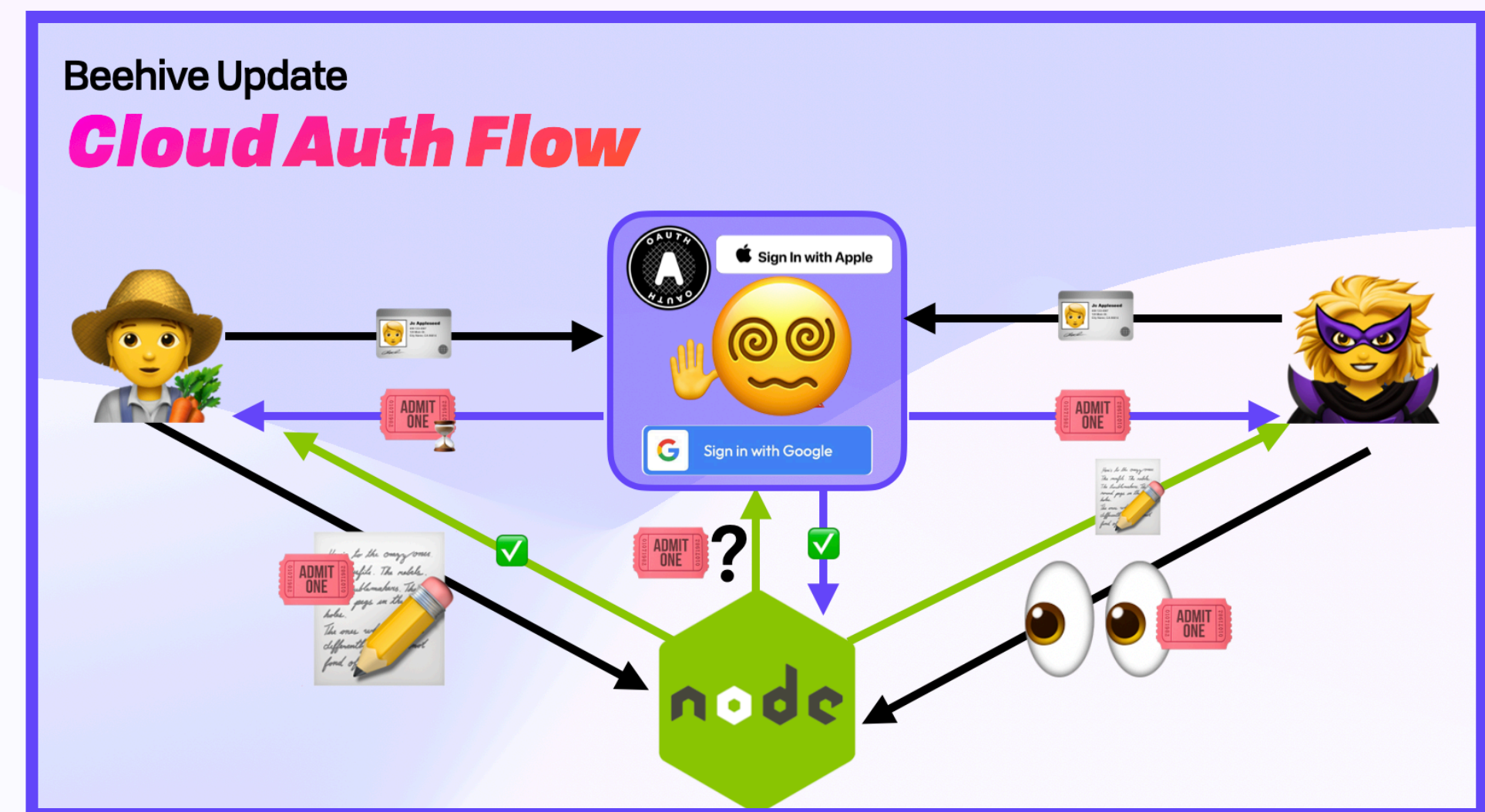


Beehive Update 

# Self-Authenticating Changes

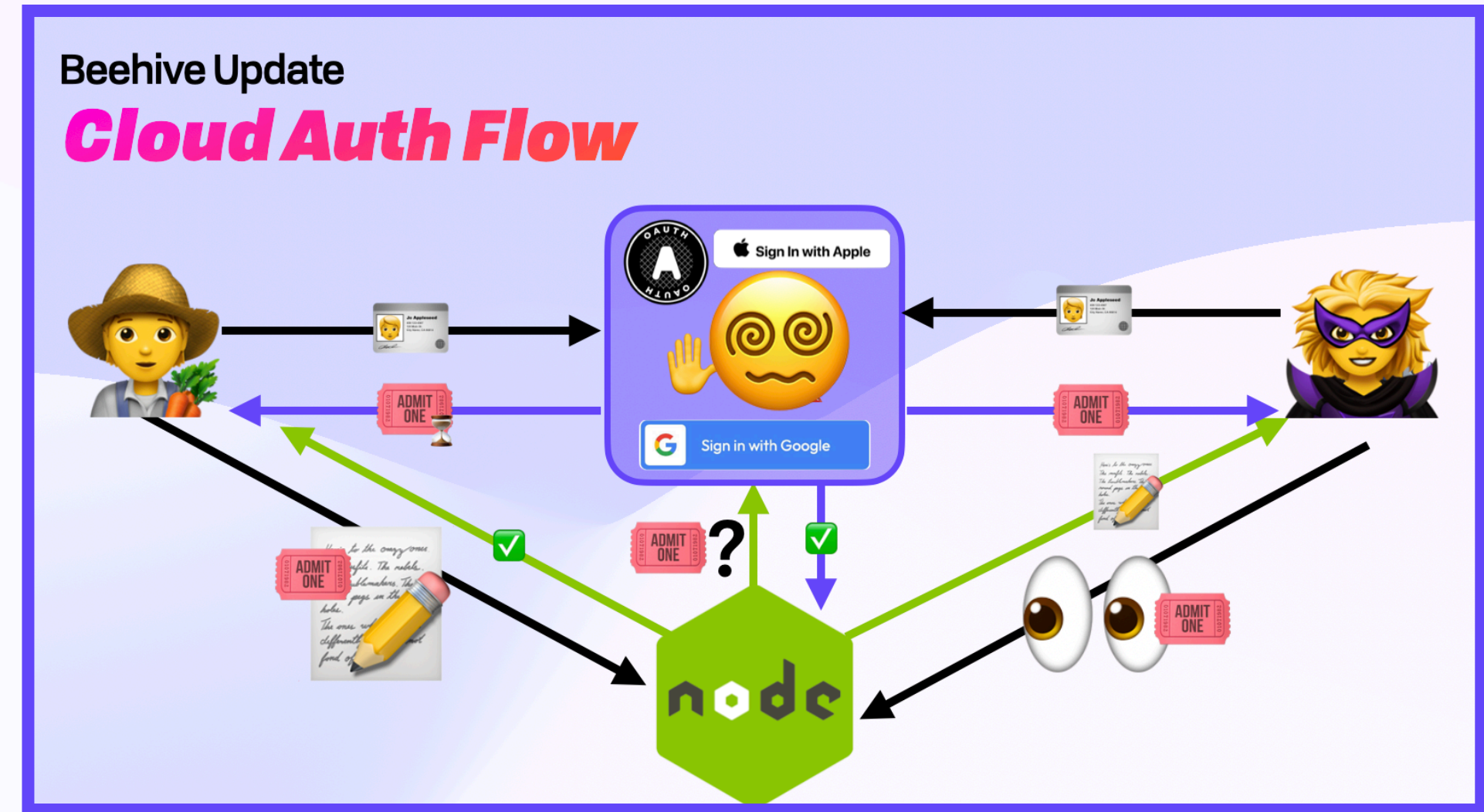
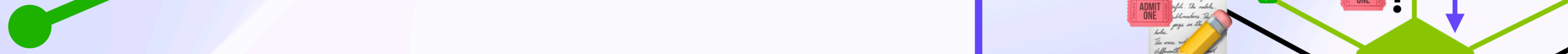
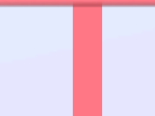


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John Appleseed

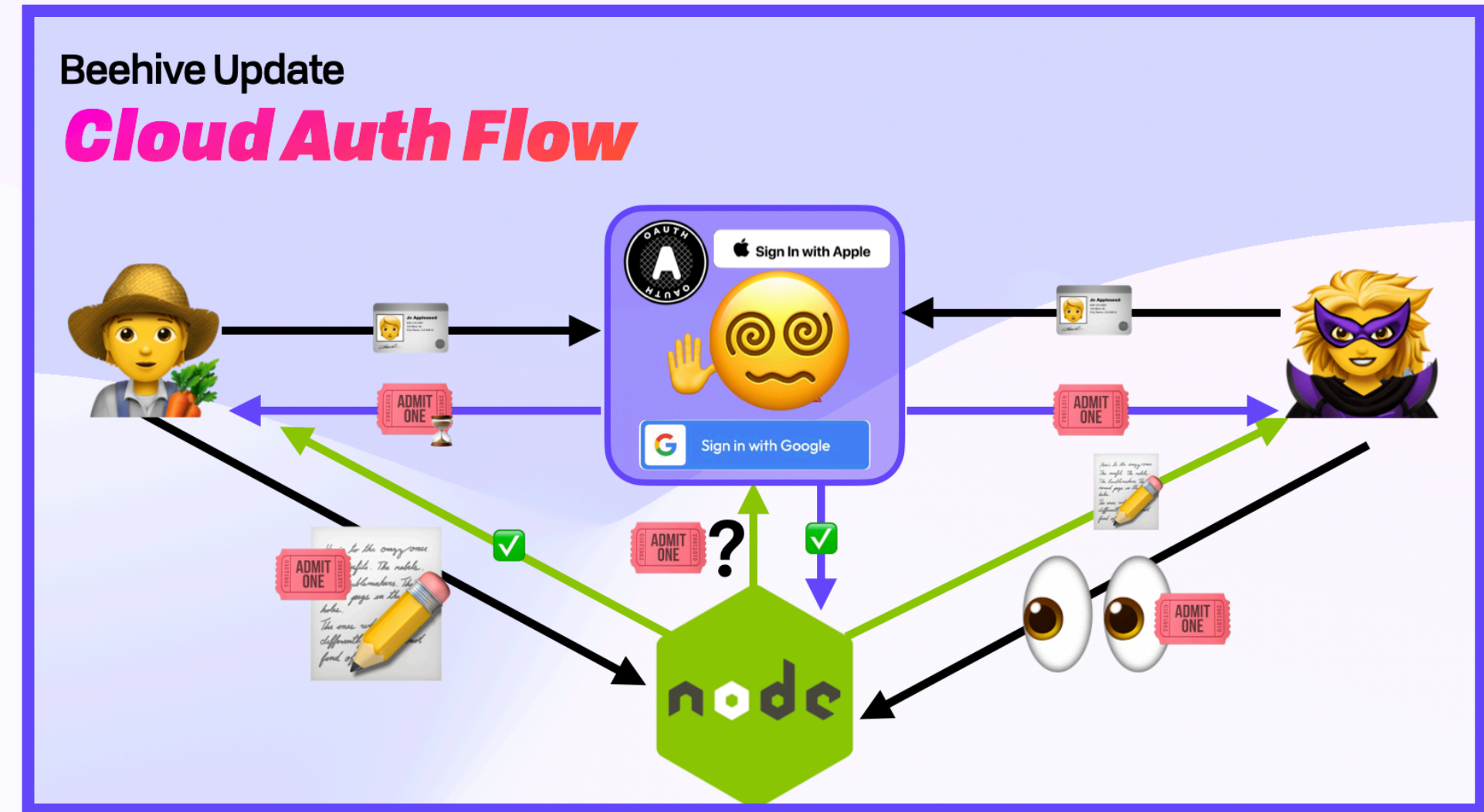
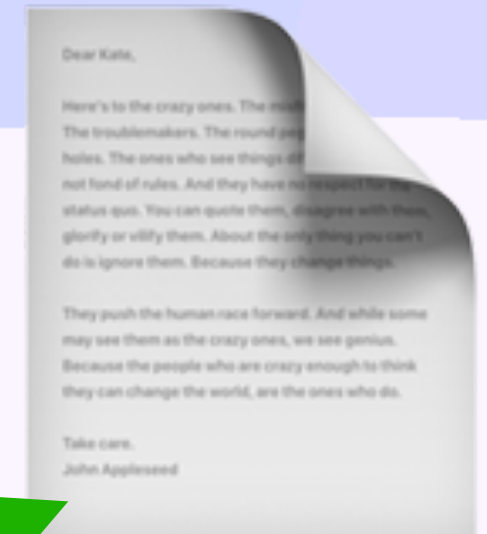
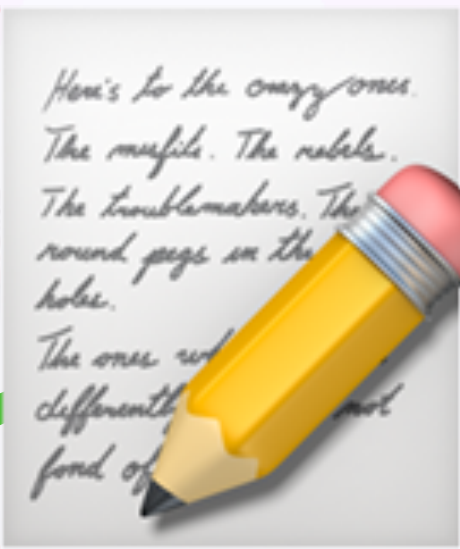
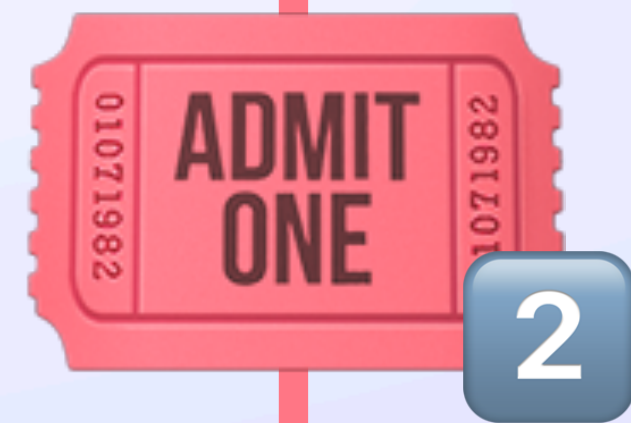


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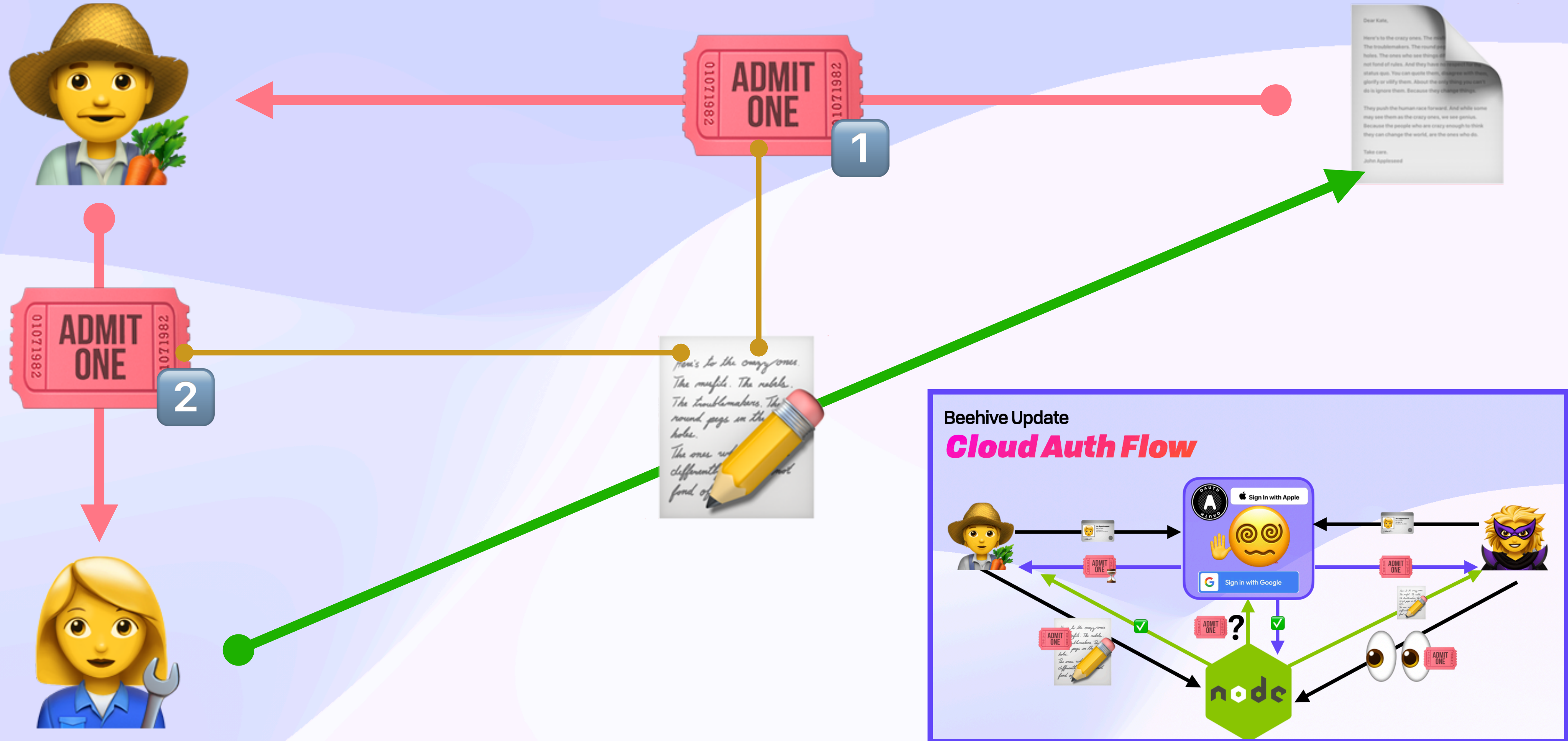
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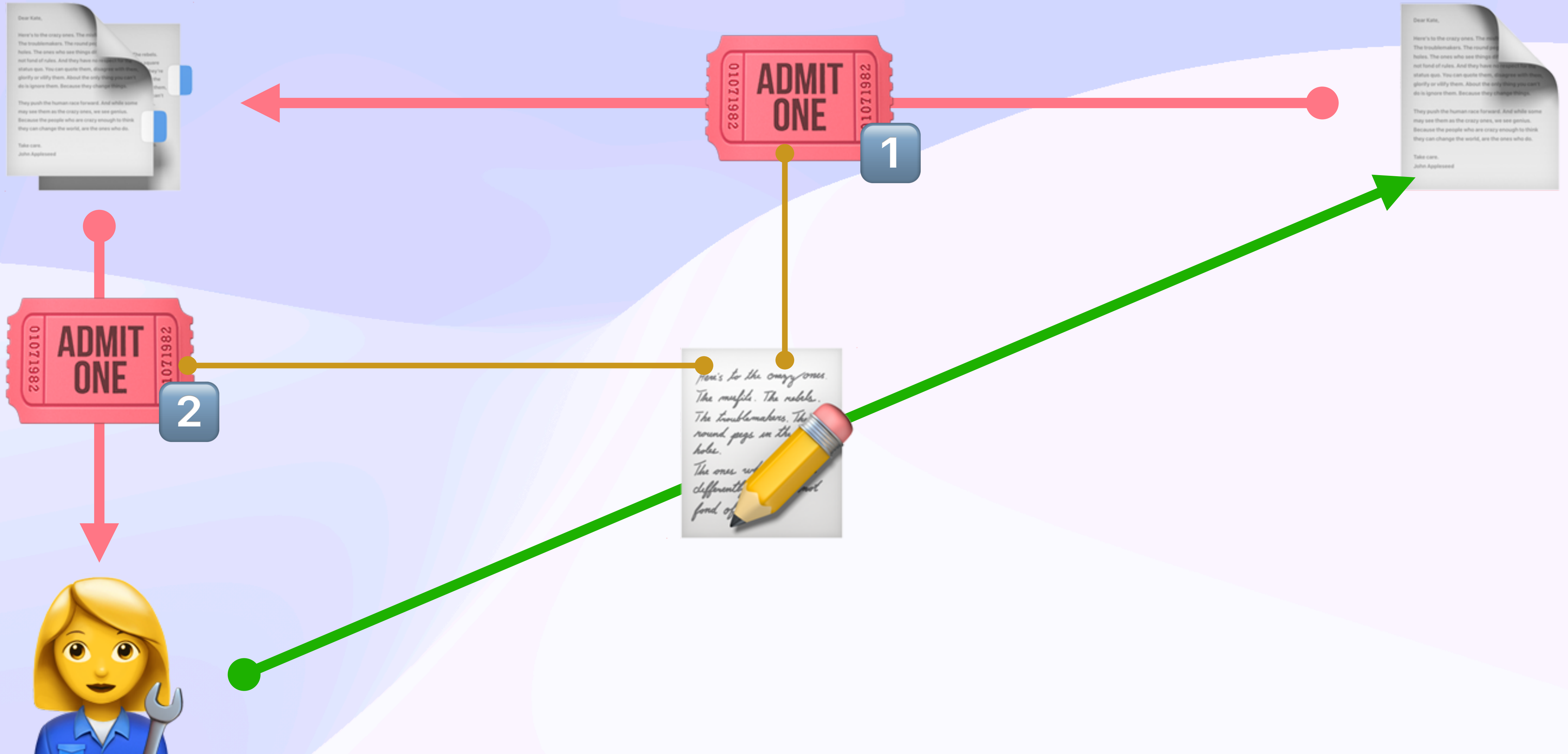
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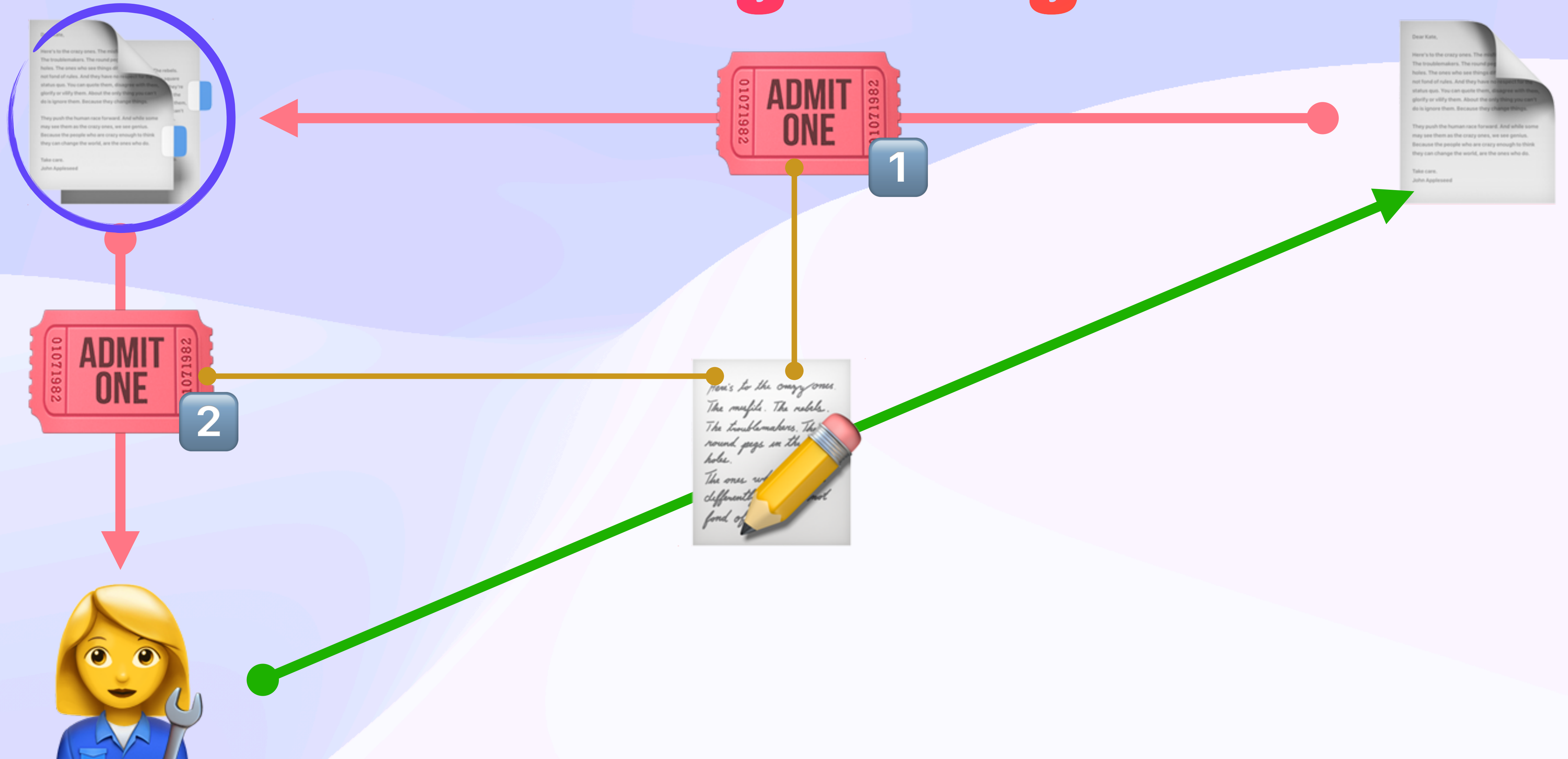
# Self-Authenticating Changes




# Self-Authenticating Changes



# Self-Authenticating Changes



Beehive Update 

# ***Read Control: Same Idea But Different***

Beehive Update 🐝

# ***Read Control: Same Idea But Different***





Beehive Update 

# **Read Control: Same Idea But Different**



Here's to the crazy ones.  
The mavericks. The rebels.  
The troublemakers. The  
round pegs in the  
holes.  
The ones who  
see differently. They  
are not  
fond of  
rules.



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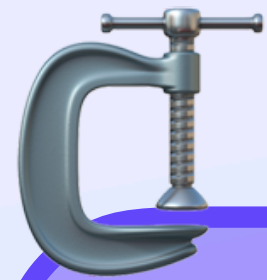


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Beehive Update 

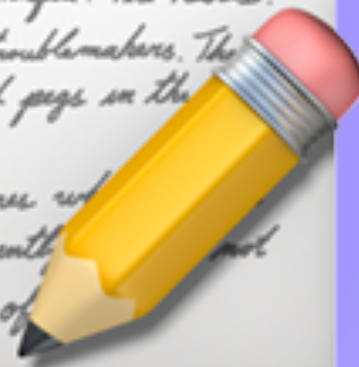
# **Read Control: Same Idea But Different**



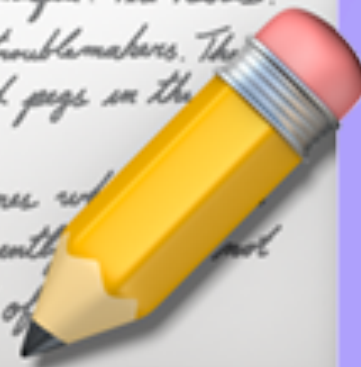
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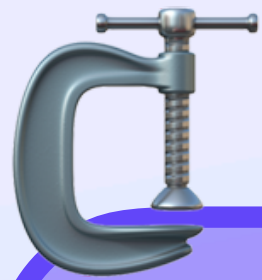


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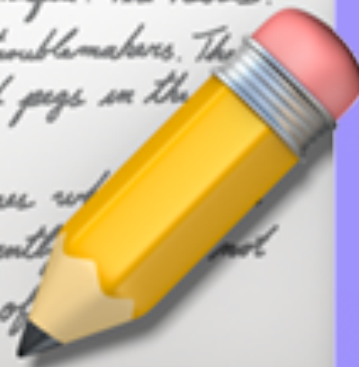


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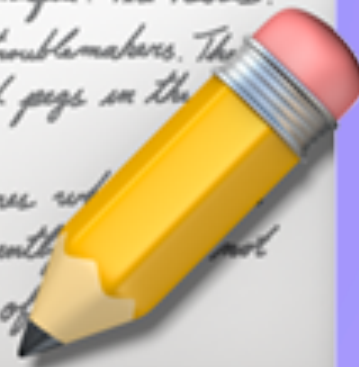
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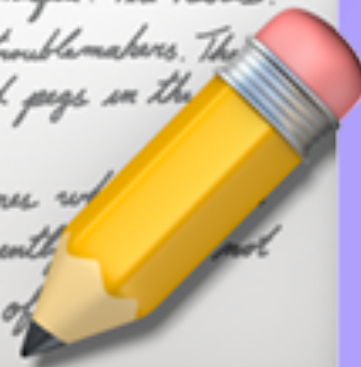
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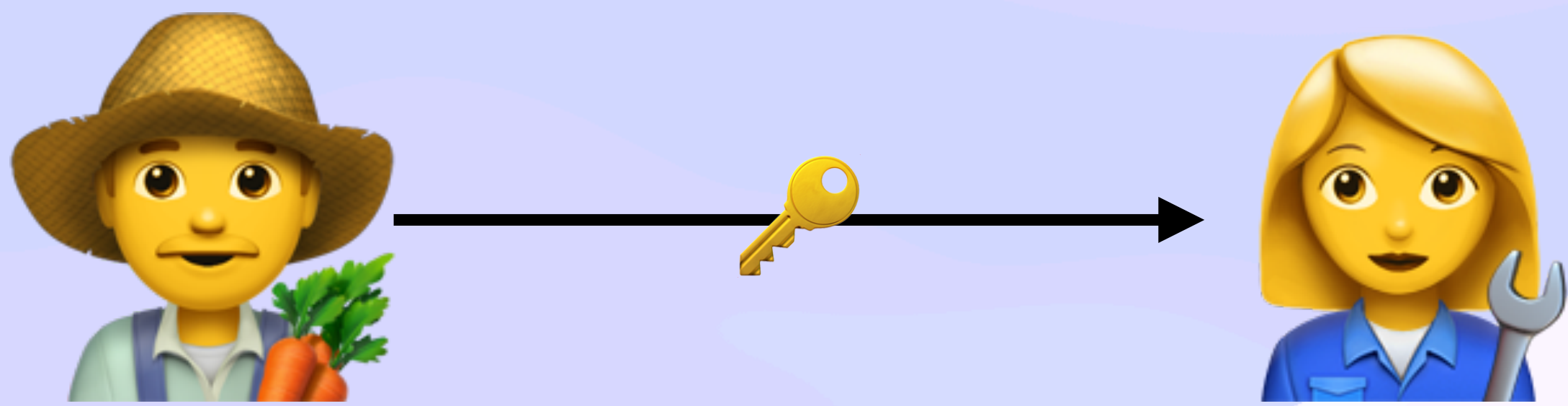


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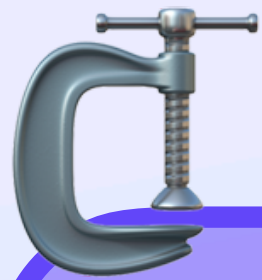
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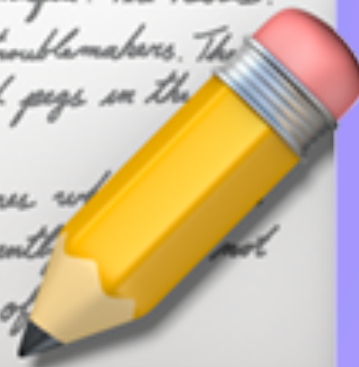
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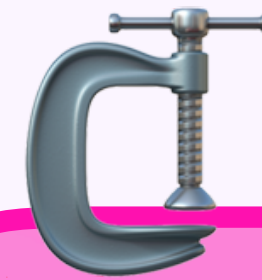
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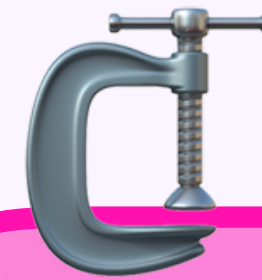
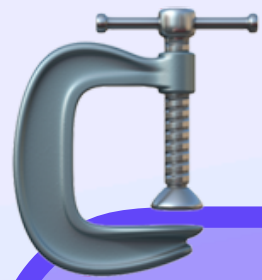
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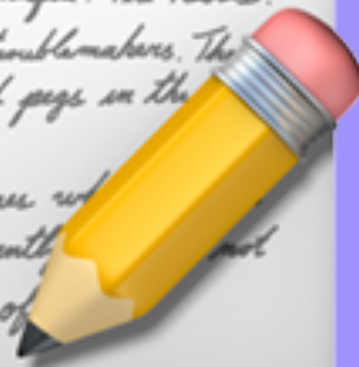
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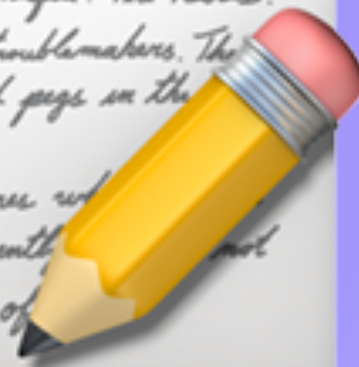
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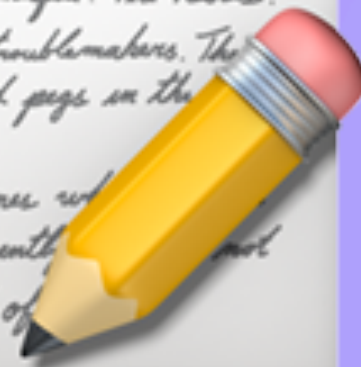
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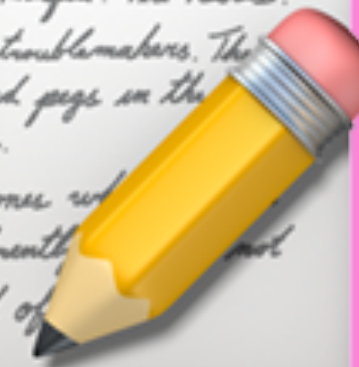
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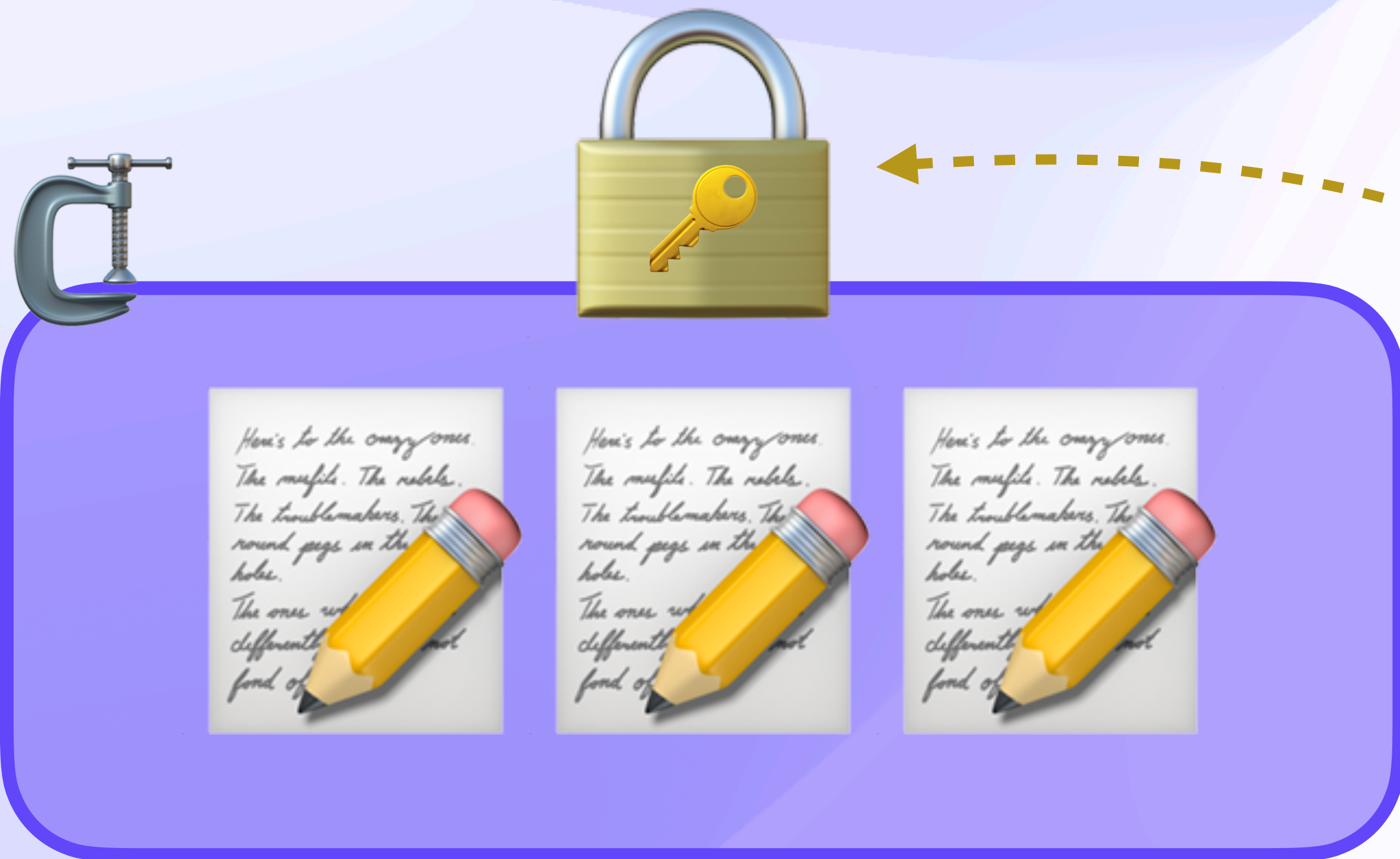
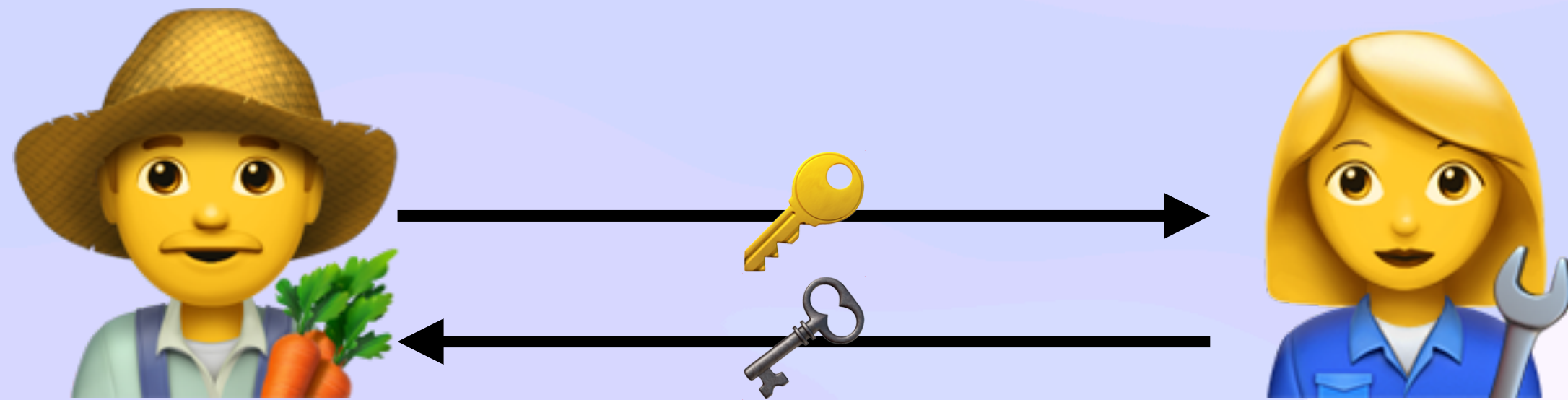
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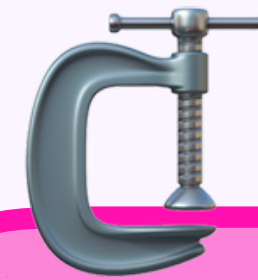
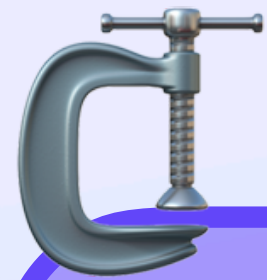
A purple rounded rectangular box containing a silver padlock with a yellow key inserted. A silver C-clamp is attached to the top left corner. Below the padlock are three identical pieces of lined paper, each with a yellow pencil resting on it. The text on each piece of paper reads: "Here's to the crazy ones. The mavericks. The rebels. The troublemakers. The round pegs in the holes. The ones who see differently. Not fond of rules."



A pink rounded rectangular box containing a silver padlock with a silver key inserted. A silver C-clamp is attached to the top left corner. Below the padlock are three identical pieces of lined paper, each with a yellow pencil resting on it. The text on each piece of paper reads: "Here's to the crazy ones. The mavericks. The rebels. The troublemakers. The round pegs in the holes. The ones who see differently. Not fond of rules."



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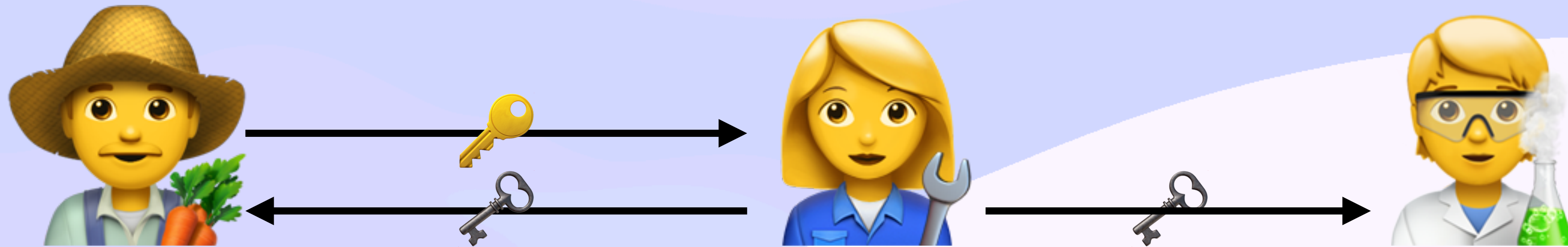
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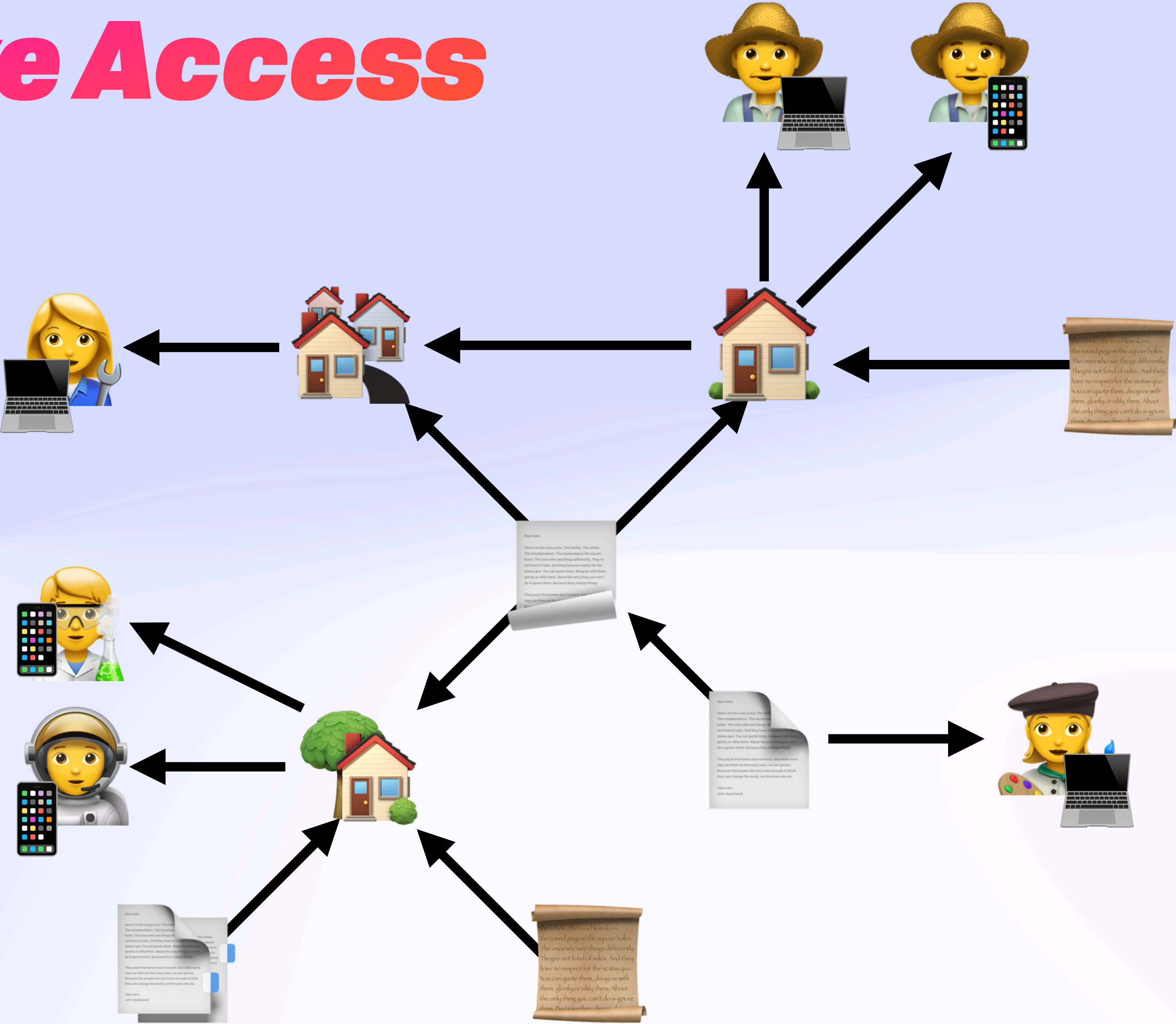


A purple rounded rectangular box containing a silver C-clamp on the left and a yellow padlock with a yellow key in the center. Below the padlock are three notecards, each with a yellow pencil. The text on each notecard is: "Here's to the crazy ones. The mavericks. The rebels. The troublemakers. The round pegs in the holes. The ones who see differently. Not fond of rules."

A pink rounded rectangular box containing a silver C-clamp on the left and a yellow padlock with a silver key in the center. Below the padlock are three notecards, each with a yellow pencil. The text on each notecard is: "Here's to the crazy ones. The mavericks. The rebels. The troublemakers. The round pegs in the holes. The ones who see differently. Not fond of rules."

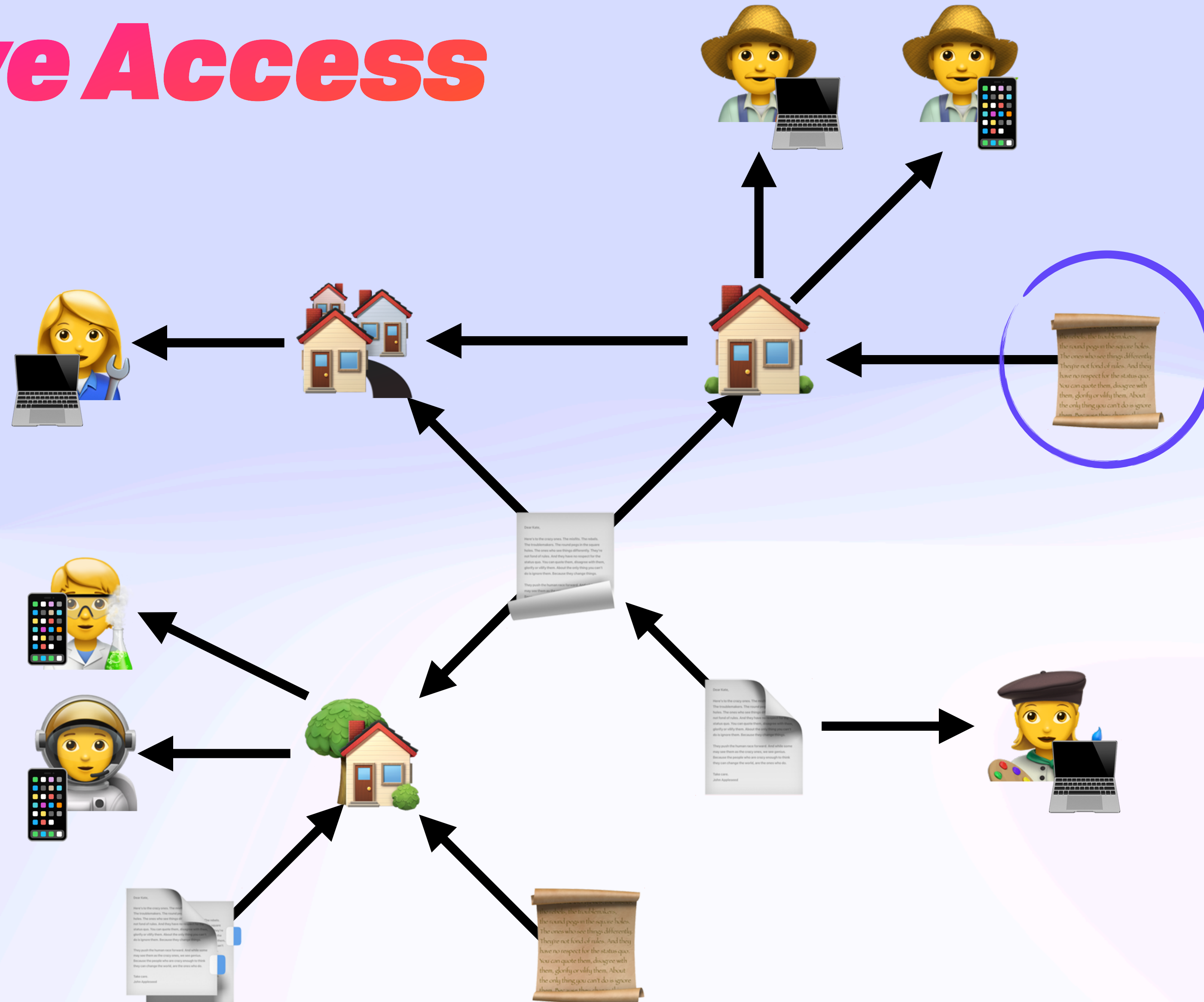


# Transitive Access



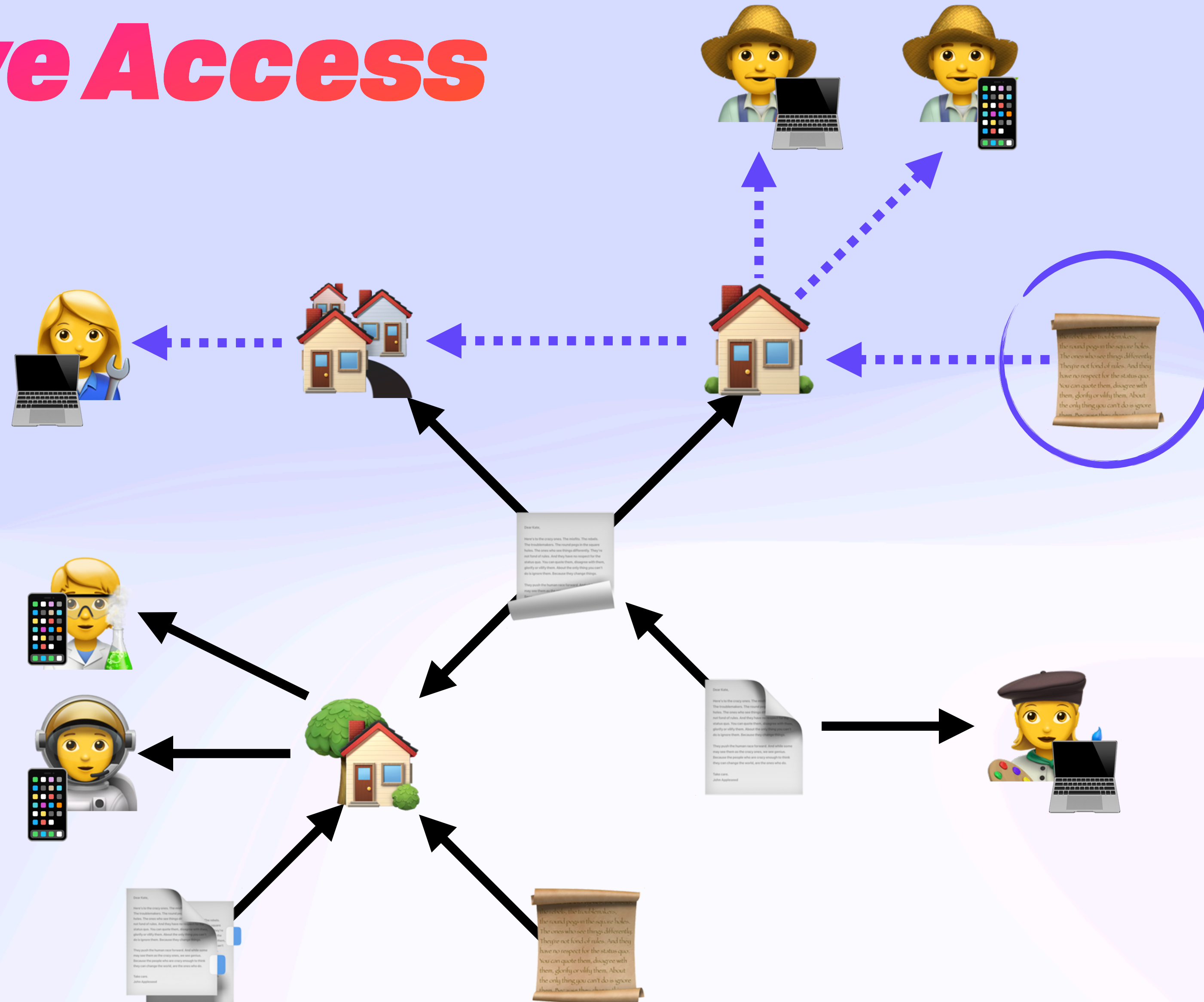
# Beehive Update

# Transitive Access



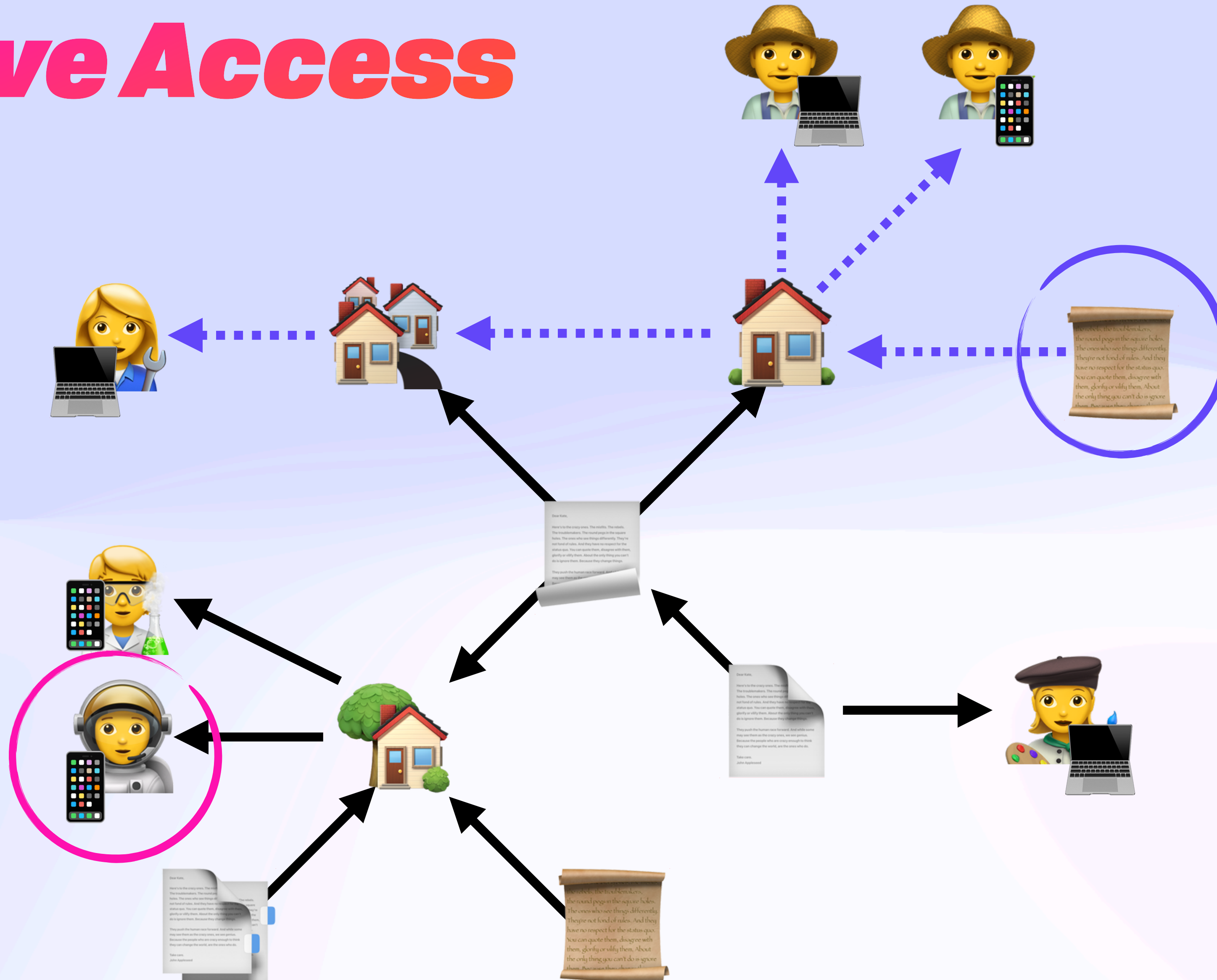
Beehive Update 

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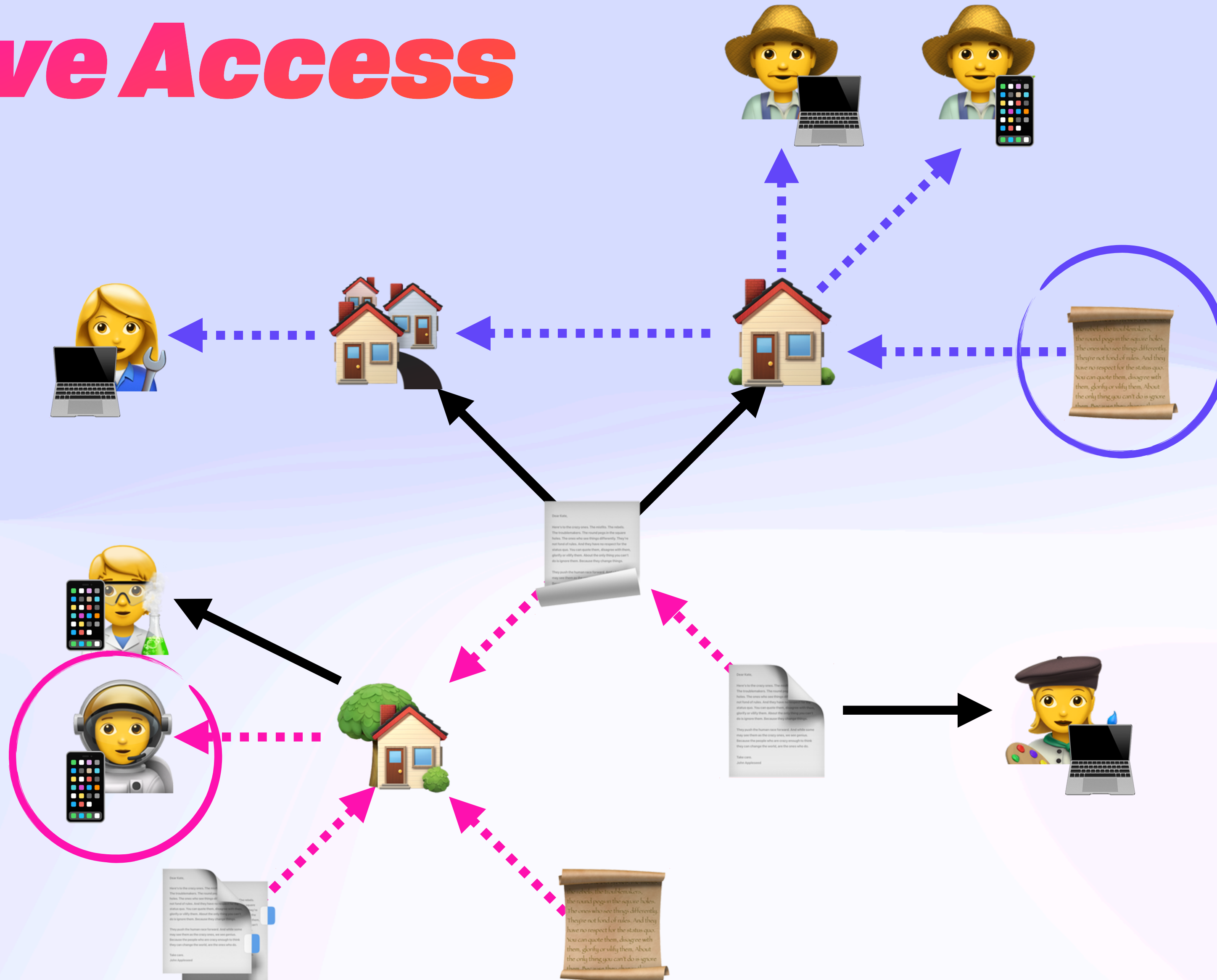
# Beehive Update

# Transitive Access



# Beehive Update

# Transitive Access



Auth vs Sync Server

***Notably Out of Scope, But Composes Well***

## Auth vs Sync Server

# *Notably Out of Scope, But Composes Well*

- User "identity"
- Key recovery



# *Live Demo*

...because we like to live dangerously 🦹‍♀️