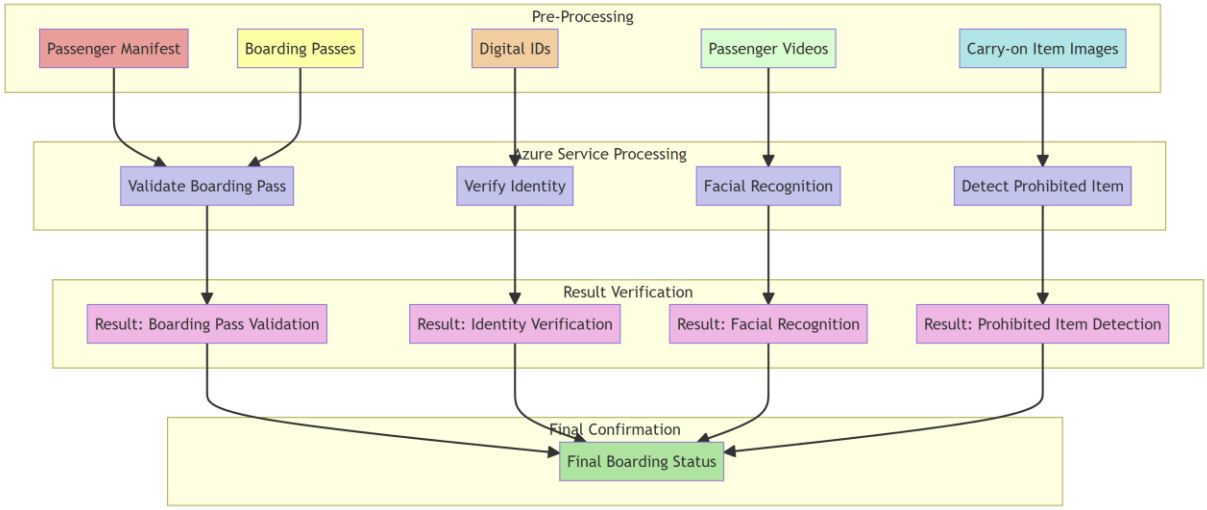
## Dataflow diagram




## Mermaid Text

```
graph TB
    subgraph "Pre-Processing"
        manifest[Passenger Manifest]
        ids[Digital IDs]
        passes[Boarding Passes]
        videos[Passenger Videos]
        carryOn[Carry-on Item Images]
    end

    subgraph "Azure Service Processing"
        validateBoardingPass[Validate Boarding Pass]
        verifyIdentity[Verify Identity]
        facialRecognition[Facial Recognition]
        detectProhibitedItem[Detect Prohibited Item]
    end
```

```
subgraph "Result Verification"
   resultBoardingPass[Result: Boarding Pass Validation]
   resultIdentity[Result: Identity Verification]
   resultFacialRecognition[Result: Facial Recognition]
   resultProhibitedItem[Result: Prohibited Item Detection]
end

subgraph "Final Confirmation"
   finalStatus[Final Boarding Status]
end

manifest --> validateBoardingPass
ids --> verifyIdentity
passes --> validateBoardingPass
videos --> facialRecognition
carryOn --> detectProhibitedItem

validateBoardingPass --> resultBoardingPass
verifyIdentity --> resultIdentity
facialRecognition --> resultFacialRecognition
detectProhibitedItem --> resultProhibitedItem

resultBoardingPass --> finalStatus
resultIdentity --> finalStatus
resultFacialRecognition --> finalStatus
resultProhibitedItem --> finalStatus

style manifest fill:#ff9999
```

```
    style ids fill:#ffcc99
    style passes fill:#ffff99
    style videos fill:#ccffcc
    style carryOn fill:#99e6e6
    style validateBoardingPass fill:#c2c2f0
    style verifyIdentity fill:#c2c2f0
    style facialRecognition fill:#c2c2f0
    style detectProhibitedItem fill:#c2c2f0
    style resultBoardingPass fill:#ffb3e6
    style resultIdentity fill:#ffb3e6
    style resultFacialRecognition fill:#ffb3e6
    style resultProhibitedItem fill:#ffb3e6
    style finalStatus fill:#99e699
```

Absolutely! Below is an enhanced Mermaid diagram text for the walkthrough provided earlier. The enhancement is made considering a clear visual representation of the flow and processes.

```mermaid
graph TB
    subgraph "Pre-Processing"
        manifest[Passenger Manifest]
        ids[Digital IDs]
        passes[Boarding Passes]
        videos[Passenger Videos]
        carryOn[Carry-on Item Images]
    end

    subgraph "Azure Service Processing"
        validateBoardingPass[Validate Boarding Pass]
```

```
    verifyIdentity[Verify Identity]
    facialRecognition[Facial Recognition]
    detectProhibitedItem[Detect Prohibited Item]
end

subgraph "Result Verification"
    resultBoardingPass[Result: Boarding Pass Validation]
    resultIdentity[Result: Identity Verification]
    resultFacialRecognition[Result: Facial Recognition]
    resultProhibitedItem[Result: Prohibited Item Detection]
end

subgraph "Final Confirmation"
    finalStatus[Final Boarding Status]
end

manifest --> validateBoardingPass
ids --> verifyIdentity
passes --> validateBoardingPass
videos --> facialRecognition
carryOn --> detectProhibitedItem

validateBoardingPass --> resultBoardingPass
verifyIdentity --> resultIdentity
facialRecognition --> resultFacialRecognition
detectProhibitedItem --> resultProhibitedItem

resultBoardingPass --> finalStatus
resultIdentity --> finalStatus
```

```
resultFacialRecognition --> finalStatus

resultProhibitedItem --> finalStatus


style manifest fill:#ff9999

style ids fill:#ffcc99

style passes fill:#ffff99

style videos fill:#ccffcc

style carryOn fill:#99e6e6

style validateBoardingPass fill:#c2c2f0

style verifyIdentity fill:#c2c2f0

style facialRecognition fill:#c2c2f0

style detectProhibitedItem fill:#c2c2f0

style resultBoardingPass fill:#ffb3e6

style resultIdentity fill:#ffb3e6

style resultFacialRecognition fill:#ffb3e6

style resultProhibitedItem fill:#ffb3e6

style finalStatus fill:#99e699
```

# Walkthrough:

## Walkthrough for Autonomous Passenger Boarding Kiosk Development

**1. Pre-Processing Phase: Input Acquisition**

- **Passenger Manifest:** A structured list containing details of all passengers. This dataset is pivotal for validating the authenticity and legitimacy of the boarding pass details.

- **Digital IDs:** Scanned or digital versions of ID proofs that contain the passenger's photograph and other personal details. This data is used for verifying the identity of the passenger and validating the information against the boarding pass and manifest.

- **Boarding Passes:** Digital or scanned boarding passes contain flight and passenger details. These are crucial for extracting passenger information and validating it against the manifest list.

- **Passenger Videos:** Short video clips of passengers performing facial recognition to verify that the person at the kiosk matches the ID and boarding pass.

- **Carry-On Item Image*:** Images of the passenger's carry-on luggage are needed to inspect for prohibited items using a custom-trained machine learning model.

**2. Azure Service Processing Phase: Data Validation and Verification**

- **Validate Boarding Pass:** Utilizing Azure Form Recognizer, the system extracts and validates passenger details from the boarding passes. It ensures that the passenger is legitimately scheduled for the flight.

- **Verify Identity:** Azure Form Recognition is also used to extract personal details and face data from the digital IDs. The system ensures that the boarding pass, digital ID, and manifest information correlate, authenticating the passenger's identity.

- **Facial Recognition:** Leverage the Azure Video Indexer service to analyze the passenger videos and perform facial recognition. It ensures that the passenger present at the kiosk matches the provided ID.

- **Detect Prohibited Item:** A machine learning model, trained with Azure Custom Vision using sample lighter images, scans carry-on item images for prohibited items, maintaining security and compliance with airline regulations.

**3. Result Verification Phase: Cross-Verification of Results**

- **Result: Boarding Pass Validation**: The outcome, whether the passenger details are legitimate and correlate with the manifest.

- **Result: Identity Verification:** The outcome, indicating whether the identity verification (boarding pass vs. digital ID vs. manifest) is successful.

- **Result: Facial Recognition:** Indicates if the passenger present aligns with the ID and boarding pass.

- **Result: Prohibited Item Detection:** Provides insights into whether any prohibited items are detected in the passenger's carry-on luggage.

**4. Final Confirmation Phase: Boarding Decision**

- **Final Boarding Status**: Combining all validation results, the system either confirms the passenger for boarding or flags them for manual verification. If all validations are successful, the kiosk allows the passenger to proceed. If any issues arise (e.g., identity mismatch, prohibited items), the kiosk instructs the passenger to consult with airline representatives.