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# Digital Verification of Human and Machine Identities

— Evaluating PKI-Based Trust Models

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# TRUST UNDERPINS SECURE DIGITAL COMMUNICATION PROTOCOLS.

- Critical Trust Components
  - Secure Infrastructure
    - PKI – X.509
      - Authentication
      - Encryption

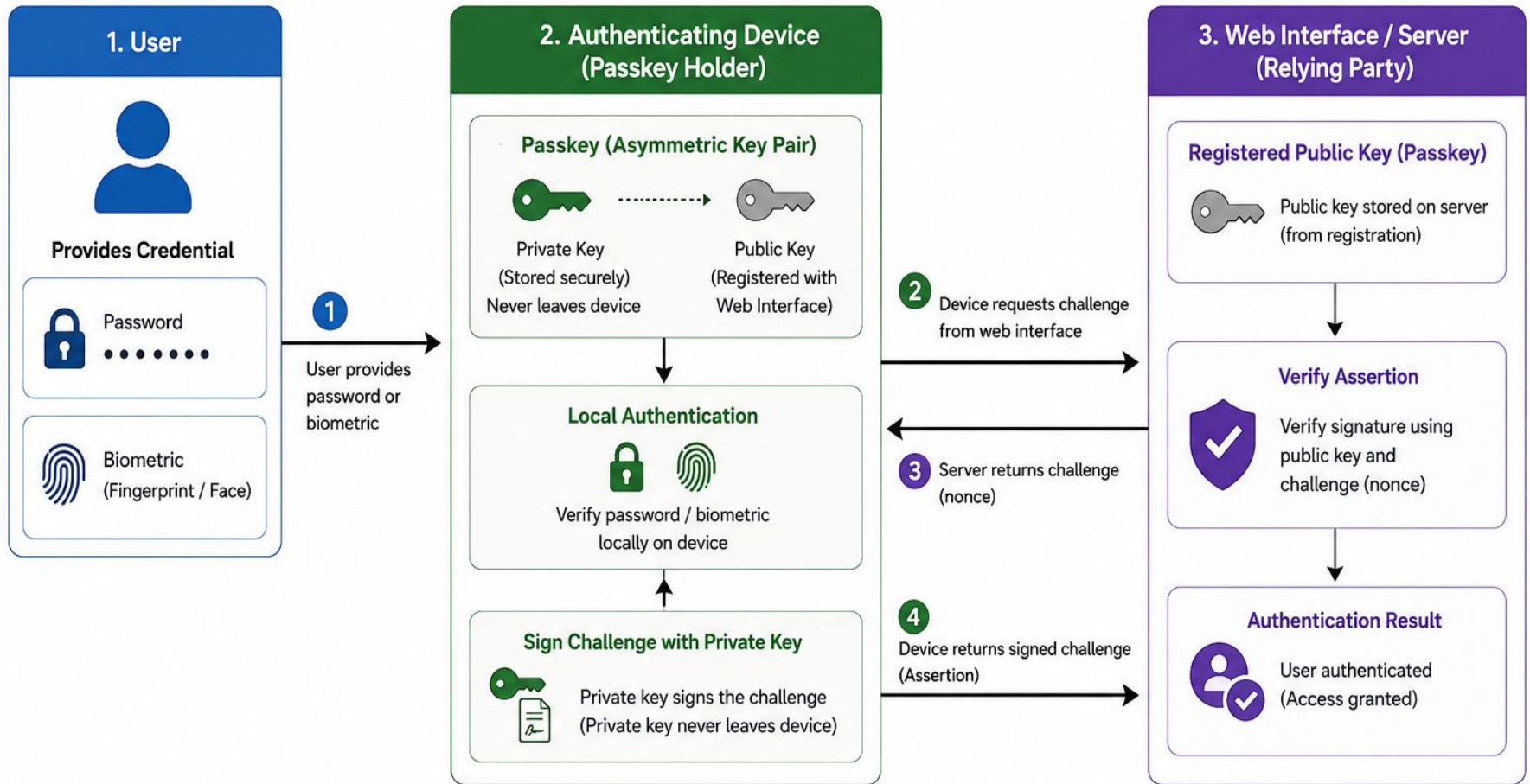
# Device/Machine Authentication

- PKI Based Trust Model - Private and Public Key Cryptography
  - FIDO Alliance - Passkeys
  - Agentic AI - Secure Tokens

# User Authentication

- Pass Codes
  - Physical metrics
    - Biometrics (Fingerprints, Facial and Retina Scans)
  - Cognitive metrics
    - Text and Graphical Passwords

# Authentication Chain with Passkeys (Public Key Challenge)



■ User    ■ Authenticating Device    ■ Web Interface / Server    → Communication Flow

# Verified Identity to Agentic AI Authorization Workflow

- **Human Authentication - Passwords/Biometrics**
- **Device Authentication - Passkeys**
- **PKI Web verification - Public Key Challenge**
- **Verified Digital Identity - Assertion Token**
- **Agentic AI Authorisation - Policy Engine**
- **Secure Machine-to-Machine Communication**

# Human Authentication

- **Passwords and Biometrics**
  - **Human differentiator**
    - **Consent Management**

# Can Biometrics Truly Consent?



*Idris Elba left “speechless” after using waxwork to unlock his own phone. (2025, December 19). The Independent.*

<https://www.independent.co.uk/tv/culture/idris-elba-waxwork-madame-tussauds-london-video-b2889531.html>

# Machine Learning and AI

- **Biometric authentication can be easily defeated by generative AI.**
- **Adversaries use generative AI to bypass biometric checks by creating synthetic identities.**
- **A new paradigm of security is needed.**

# Ephemeral Credentials

- MITIGATE HARDWARE LEVEL EXTRACTION RISK
  - GENERATE PASSKEYS AND PASSWORDS IN REAL TIME
  - AVOID PERSISTENT STORAGE
  
- AGENTIC AI
  - SHORT LIVED TOKENS