@schlomo@floss.social
@schlomoschapiro

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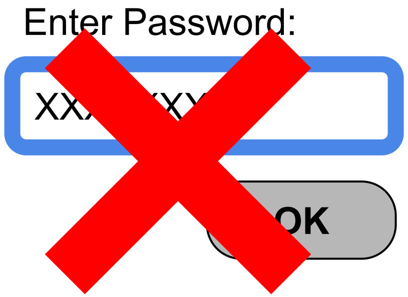
CONSULTING

Lifting the Curse of Static Credentials

Who needs passwords, anyway?



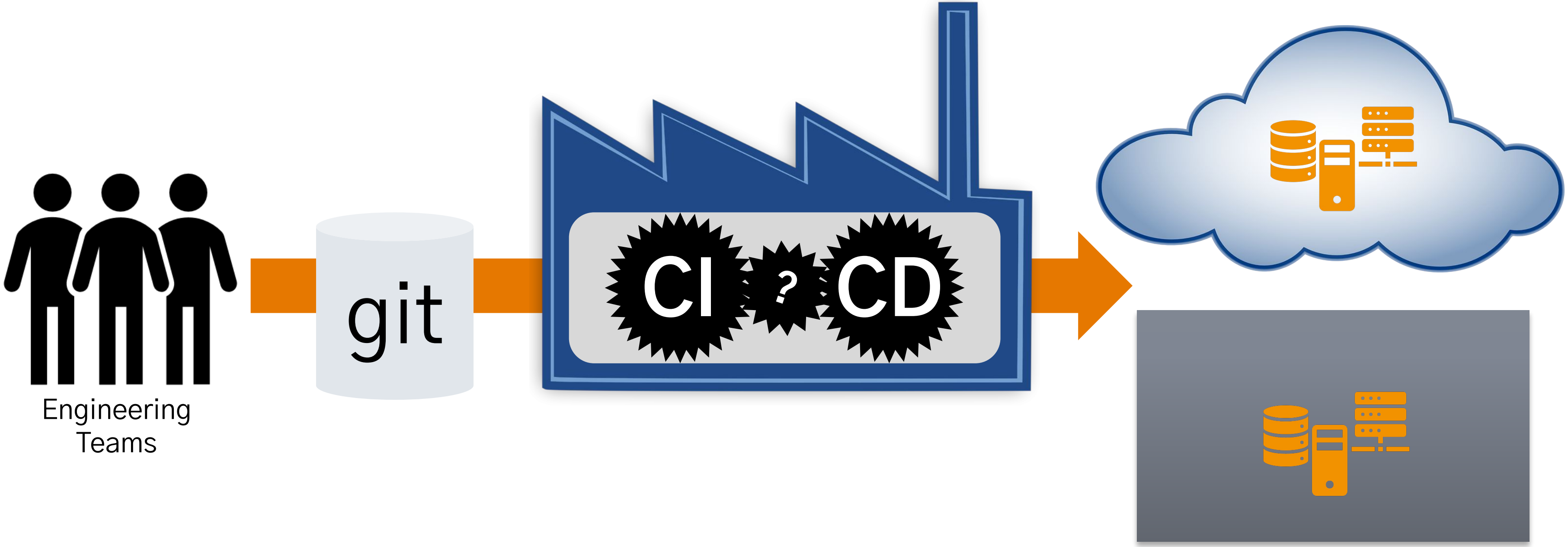
07. May 2024, DevOps Days, Berlin

Schlomo Schapiro, Associate Partner / Principal Engineer, Tektit Consulting

Agenda

1. Context: DevOps
2. Why Static Credentials?
3. Why is it a Problem?
4. What about Passkeys?
5. What should we do instead?
6. What prevents us?
7. Let’s make an effort!

Happy DevOps Campers



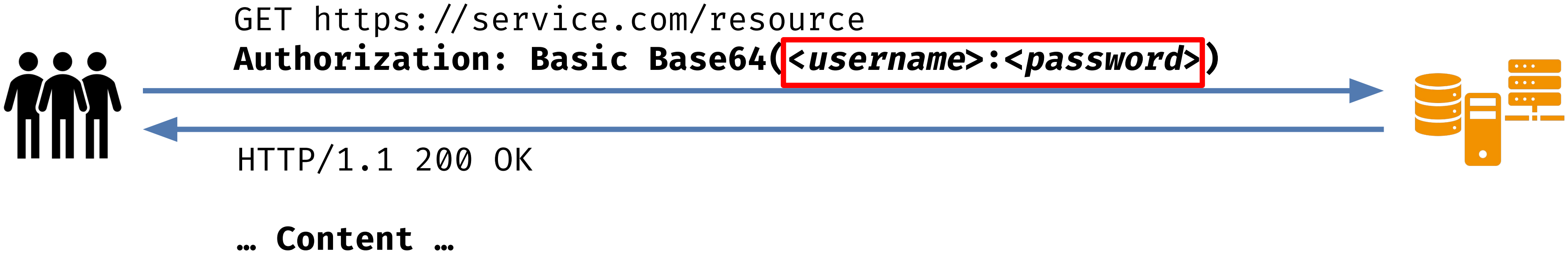
DevOps is

- ··· if every person uses the same tool for the same job
- ··· codified knowledge – everybody contributes his part to common automation
- ··· if all people have the same privileges in their tooling
- ··· if human error is equally possible for Dev and Ops
- ··· replacing people interfaces by automated decisions and processes ⬅

bit.ly/5devops

... a result

Why Static Credentials?



```
GET https://service.com/resource
Authorization: Basic Base64(<username>:<password>)
```

```
HTTP/1.1 200 OK

… Content …
```

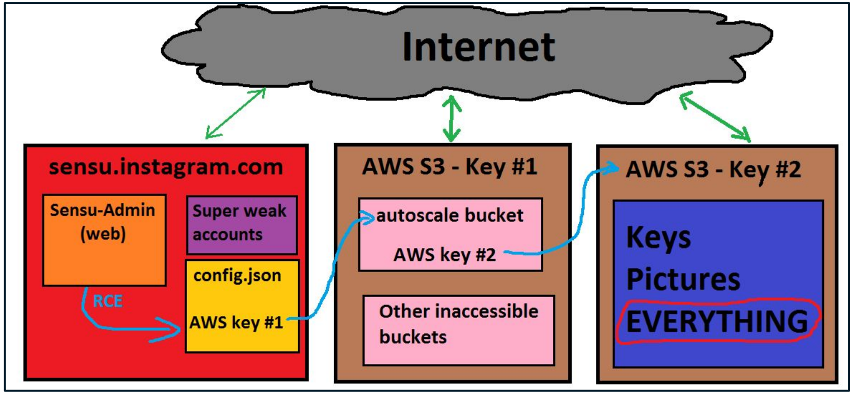
“Username & password (or API key) is simple, standard and everybody is using it”

Everybody thinks so

HALT! GIVE THE PASSWORD!

Why is it a Problem?

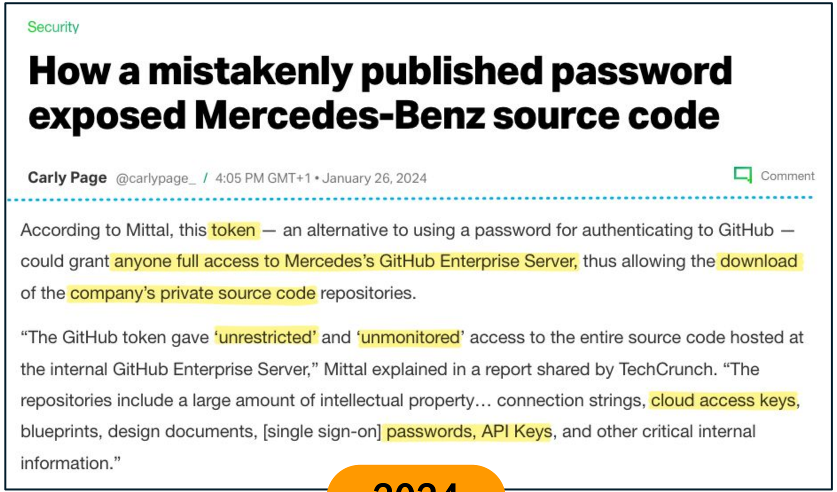
2015: Instagram’s Million Dollar Bug



Are you immune to this?

Sources:

- https://exfiltrated.com/research-Instagram-RCE.php
- https://techcrunch.com/2024/02/14/bmw-security-lapse-exposed-sensitive-company-information-researcher-finds/
- https://techcrunch.com/2024/01/26/mercedez-benz-token-exposed-source-code-github/



Security

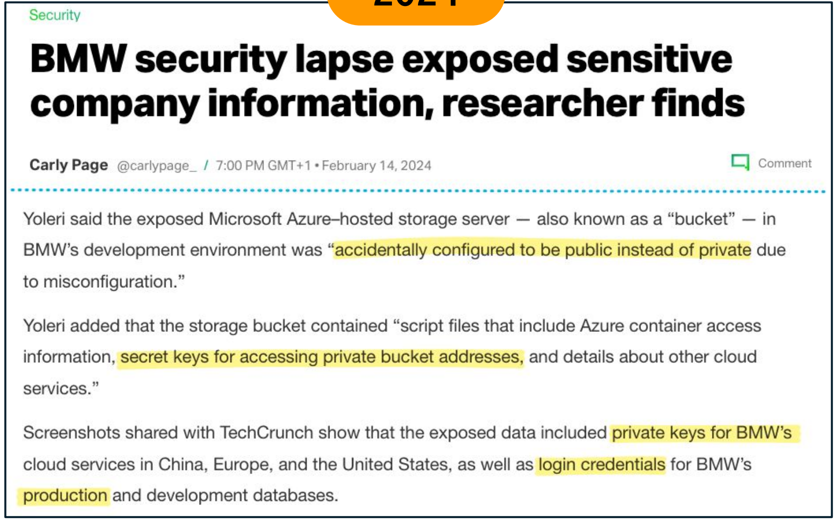
How a mistakenly published password exposed Mercedes-Benz source code

Carly Page @carlypage_ / 4:05 PM GMT+1 • January 26, 2024 Comment

According to Mittal, this token — an alternative to using a password for authenticating to GitHub — could grant anyone full access to Mercedes’s GitHub Enterprise Server, thus allowing the download of the company’s private source code repositories.

“The GitHub token gave ‘unrestricted’ and ‘unmonitored’ access to the entire source code hosted at the internal GitHub Enterprise Server,” Mittal explained in a report shared by TechCrunch. “The repositories include a large amount of intellectual property… connection strings, cloud access keys, blueprints, design documents, [single sign-on] passwords, API Keys, and other critical internal information.”

2024



Security

BMW security lapse exposed sensitive company information, researcher finds

Carly Page @carlypage_ / 7:00 PM GMT+1 • February 14, 2024 Comment

Yoleri said the exposed Microsoft Azure–hosted storage server — also known as a “bucket” — in BMW’s development environment was “accidentally configured to be public instead of private due to misconfiguration.”

Yoleri added that the storage bucket contained “script files that include Azure container access information, secret keys for accessing private bucket addresses, and details about other cloud services.”

Screenshots shared with TechCrunch show that the exposed data included private keys for BMW’s cloud services in China, Europe, and the United States, as well as login credentials for BMW’s production and development databases.

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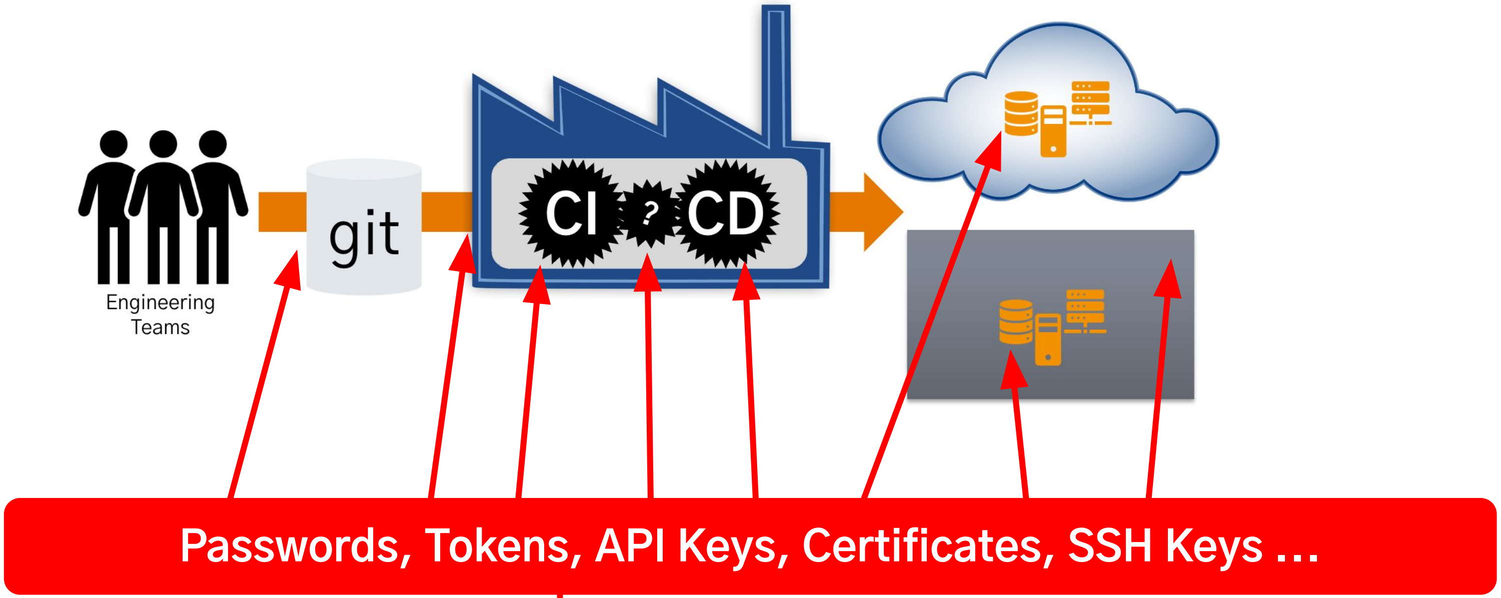
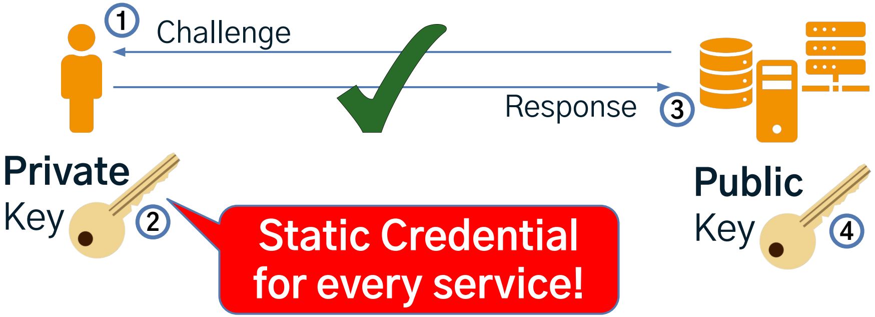
Why is it a DevOps Problem?



Passwords, Tokens, API Keys, Certificates, SSH Keys ...

DevOps is ... replacing people interfaces by automated decisions and processes

What about Passkeys?



Static Credential for every service!

Passkeys solve important problems:

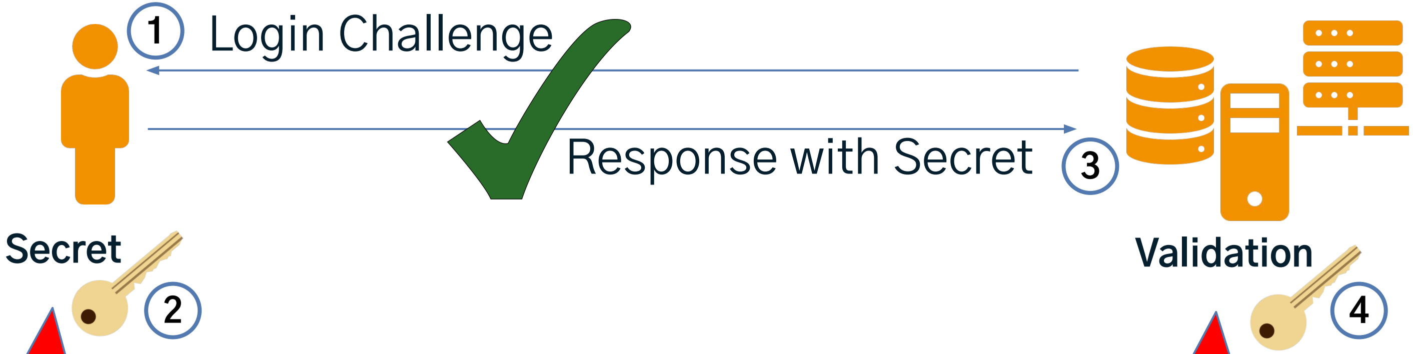
- Challenge–Response protects static credential confidentiality
- API–first design, automation friendly
- Universal standard
- **Effective SSO for consumers**

Passkey shortcomings:

- Security depends on client–side implementation (like with SSH keys)
- Confusing UX
- Lack of management controls for Enterprise or managed environments
- No backup concept – except blind trust to Cloud providers

See “Passkeys: A Shattered Dream” fy.blackhats.net.au/blog/2024–04–26–passkeys–a–shattered–dream/
for a detailed analysis by William (Firstyear) Brown, a 389DS and Kanidm developer

Root Cause: <u>Static</u> Credentials = <u>offline</u> check



1 Login Challenge

Response with Secret 3

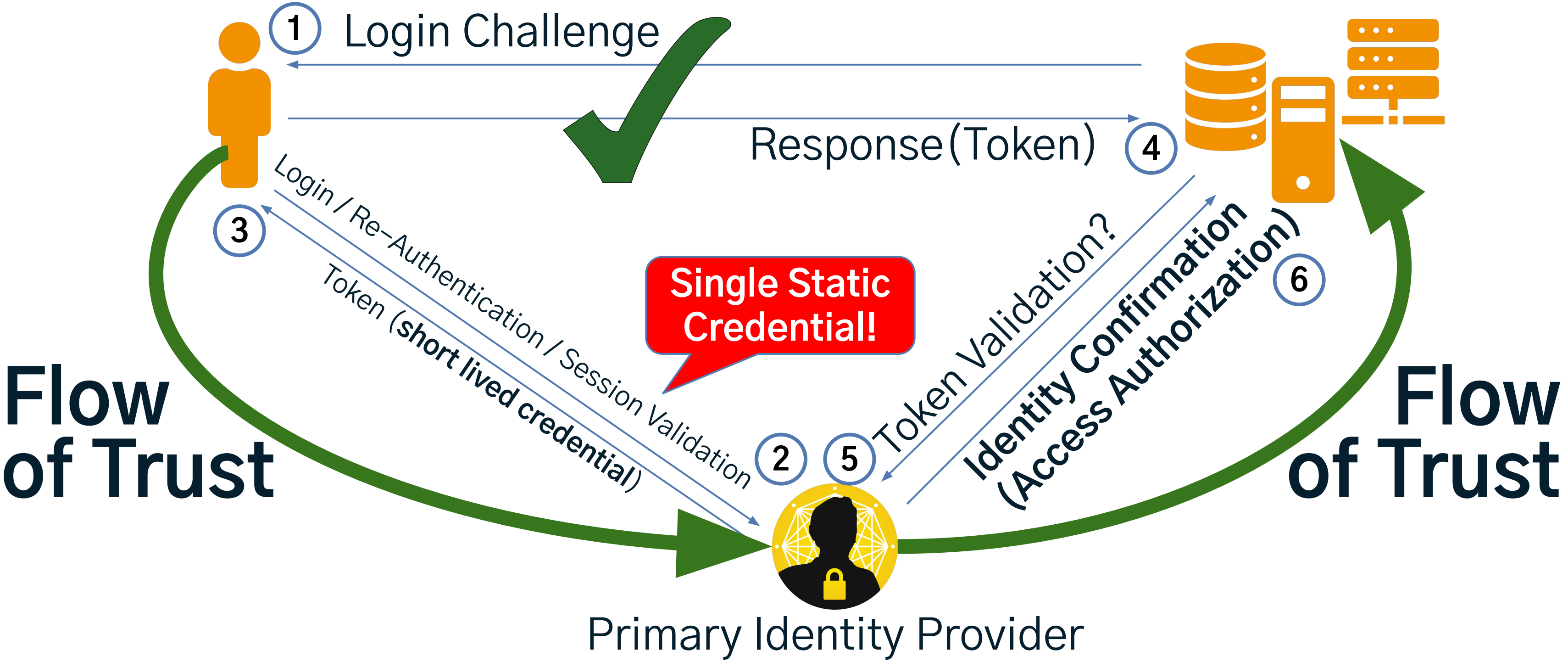
Secret 2

Validation 4

Steal the secret and gain access

Anybody with a valid secret is welcome

Solution: Identity verification = online check


1
Login Challenge
Response(Token)
4
Login / Re-Authentication / Session Validation
3
Token (short lived credential)
Single Static Credential!
2
5
Token Validation?
Identity Confirmation (Access Authorization)
6
Flow of Trust
Flow of Trust
Primary Identity Provider

Trusting Digital Identities instead of Secrets

Secrets:

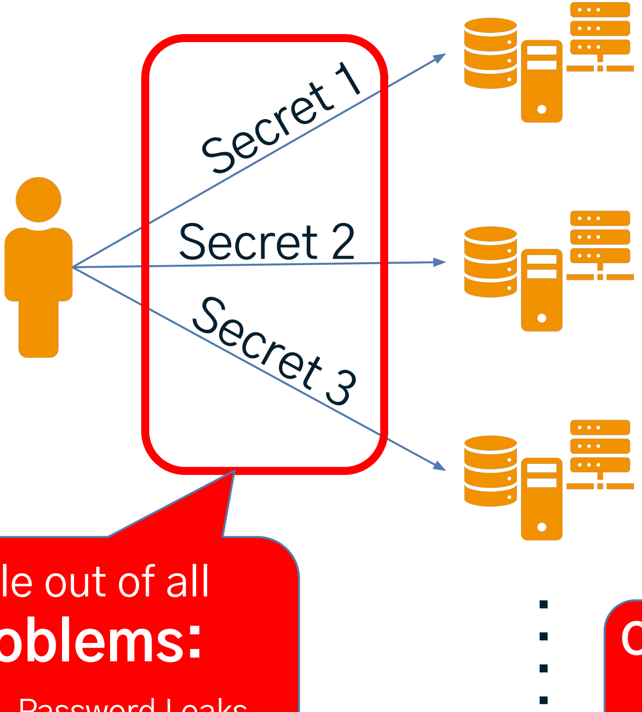
- can be used by anyone who has them – friend or foe
- are typically very short and can even be brute forced or guessed
- for machine or service users have to be stored in configuration files from where they can be leaked
- are hard to remember for humans so that they will write them down somewhere or store them in files
- typically stay the same over a long period of time
- don’t include any information about the identity of the bearer or user
- are hard to rotate on a regular base because the change has to happen in several places at the same time

Digital Identities:

- rely on a strongly protected primary identity
- can be used only by the owner
- strong assertion of identity
- can provide additional personal information
- provide short-lived / temporary secure credentials for authentication
- frequent credential rotation by design
- work for machine authentication with the help of machine identities

Trusting Digital Identities instead of Secrets

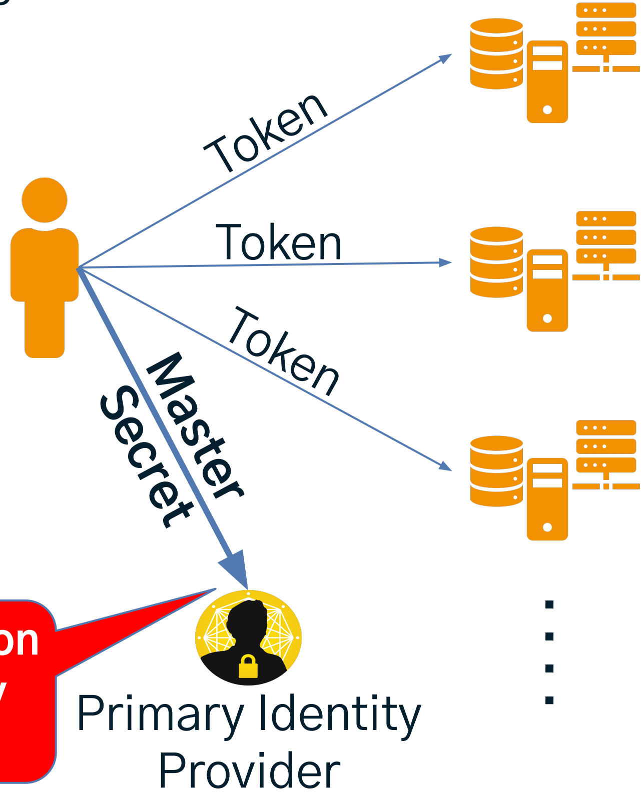
Secrets



Scale out of all **problems:**

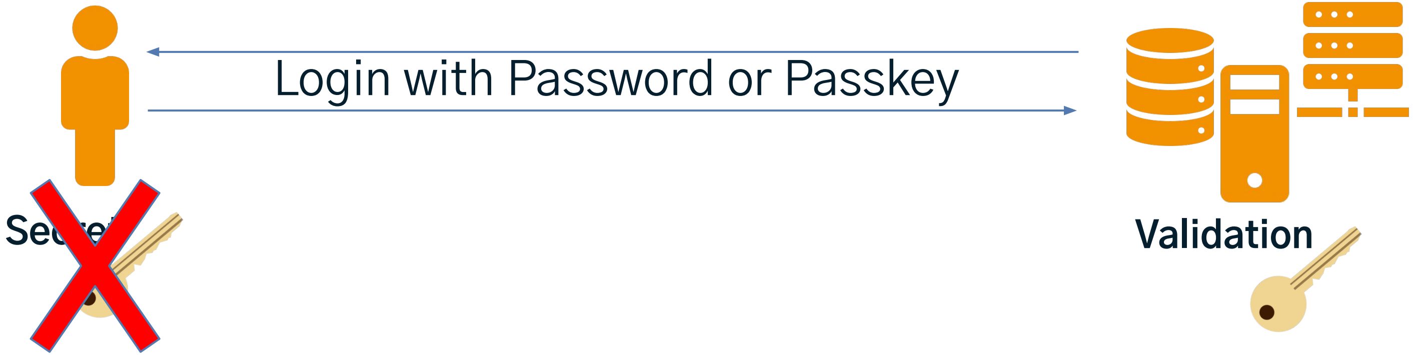
Security, Password Leaks, Password Management …

Digital Identities

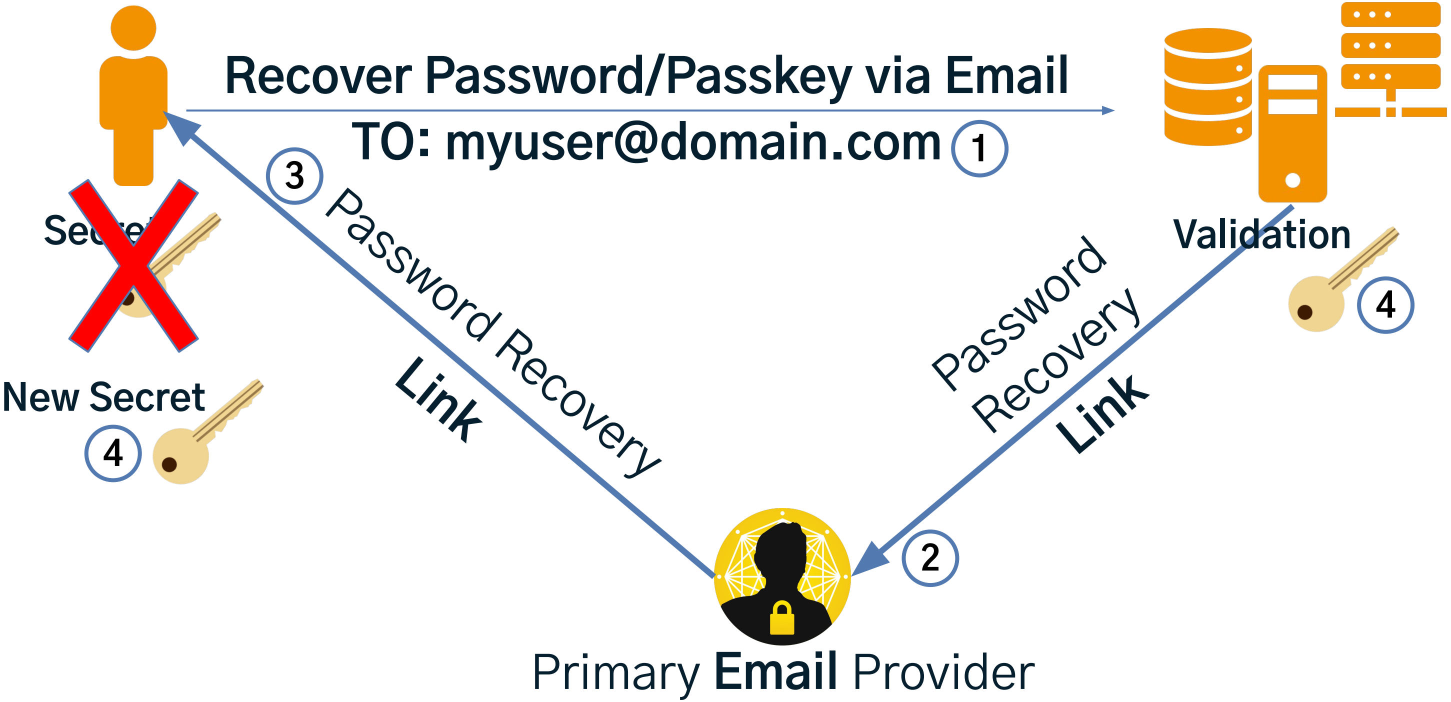


Consolidation of security concerns

The Lost Password Problem



Solution: Email Password Reset



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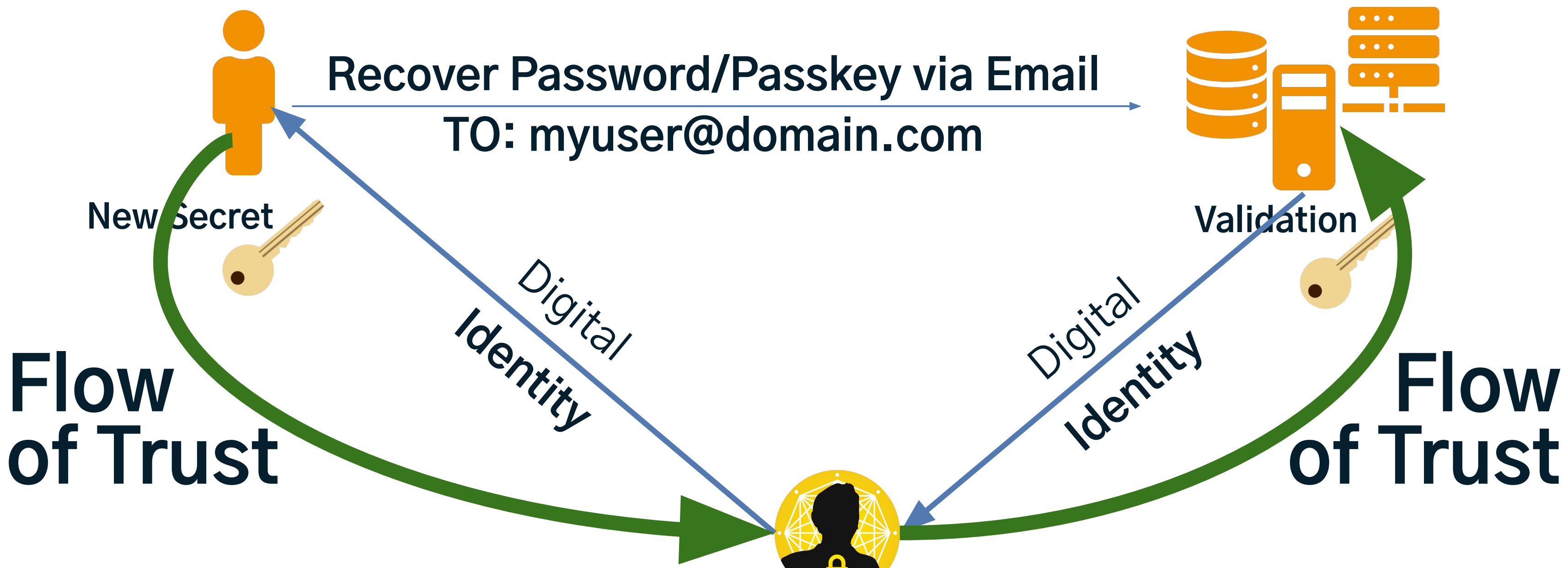
Email as Identity → ~~Poor Man's~~ Consumer SSO



Primary **Email** Provider → Primary **Identity** Provider

What should we do instead?

Consumers: Accept the fact, that your **email** is your digital identity and take care of backup and disaster recovery for **your** email, content & services.

Enterprise / Managed Environments:

- Eradicate static credentials for all internal systems – on premise & Cloud
- SSO with pass-through authentication, federated logins
- Use your primary **account** as **only digital identity**
- Use machine identities for machine communication
- and, learn from the mistakes of others!

Use existing Identity Federation Solutions!

Examples:

- Windows: Kerberos pass–through authentication
- Websites: SAML2, SCIM, OpenID Connect …
- Customer/Consumer: Email Magic Link & Passkeys
- Kubernetes: SPIFFE/SPIRE
- AWS: Identity Federation & IAM Roles for Service Accounts
- GCP: Workload Identity Federation
- Azure: Microsoft Entra Workload ID
- GitHub: IAM with SAML for SSO
- …

Fixing the basics is really hard → Hands-Off Ops

- No manual changes in production
- Dev & Ops have same permissions in production: None by Default
- Automate the ***hard*** stuff:
  - Compliance & governance
  - Distributed rolling upgrades
  - Consistent Backup & Disaster Recovery
  - Everything in your stack
- Test Driven Everything
- Standardized Tooling
- Remove static credentials
- **Fix the Basics!**

GitOps

The Role of GitOps in IT Strategy v2

Schlomo Schapiro, 21.09.2022, DevOpsDays 2022

schlomo.schapiro.org

Lifting the Curse of Static Credentials:

Let's get out of the stone age, skip the medieval ages and start the future! The reward is a significantly better security posture & user experience!

Read more in my blog at 🌐schlomo.schapiro.org

1. Lifting the Curse of Static Credentials
schlomo.schapiro.org/2016/05/lifting-curse-of-static-credentials.html
2. Eliminating the Password of Shared Accounts
schlomo.schapiro.org/2017/06/eliminating-password-of-shared-accounts.html
3. A Login Security Architecture Without Passwords
schlomo.schapiro.org/2022/02/login-security-architecture-without-passwords.html

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Q&A — How may I help you?

schlomo.schapiro.org

We are not consultants. We are Partners, Coaches, Humans, Enablers, Catalysts, Sparring Partners, Experts … and sometimes a little annoying.

I focus on IT strategy, IT governance, technology and architecture management, security and compliance automation, related organisational changes, business continuity, open source and cloud technologies – and I'm available as a Principal Engineer or Technical Product Owner for short-term / interim support.

Examples:

- ➢ **Business-IT alignment & leveraging**, developing required skills and abilities for 21st century IT, leverage AI
- ➢ **SaaS compliance & governance**, data posession vs. ownership, IAM, integrations, backup & DR, shadow IT
- ➢ **Compliance Automation**, finding the "golden path" to a "golden state"
- ➢ **Secrets Management** for Datacenter, Cloud Infrastructure, IaaS/PaaS/SaaS
- ➢ **Open Source**, from usage to contribution, writing policies, using SBOM, establishing Open Source Stewardship
- ➢ **Good Engineering Practices**, GitOps, test driven development, good architecture decisions, known tech strategy
- ➢ **Business Continuity and Disaster Recovery** for office, Cloud infrastructure, data center & SaaS, with quality assurance, emergency communication & collaboration, hot & cold standby, no-restore solution, ransomware protection, Linux Disaster Recovery / Bare Metal Restore with "Relax and Recover (rear)" Open Source tooling

schlomo.schapiro@tektitconsulting.com