Integrating Web Applications with Shibboleth

Application Authentication Done Right

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What is Shibboleth?

- Shibboleth
  - An open-source, higher-ed funded application
  - Implements SAML protocol to support federated authentication
  - Authenticates users of web apps by leveraging existing user accounts

- So what is SAML?
  - "**S**ecurity **A**ssertion **M**arkup **L**anguage"
  - Protocol (standard), NOT an application
  - Communicates Authentication information
    - Describes who(ish), how and when the user logged in
  - XML-based
  - Secure
    - Uses asymmetric key cryptography for message signing/encryption

- SAML is the UC Standard for cross-campus authentication

UC Standards?

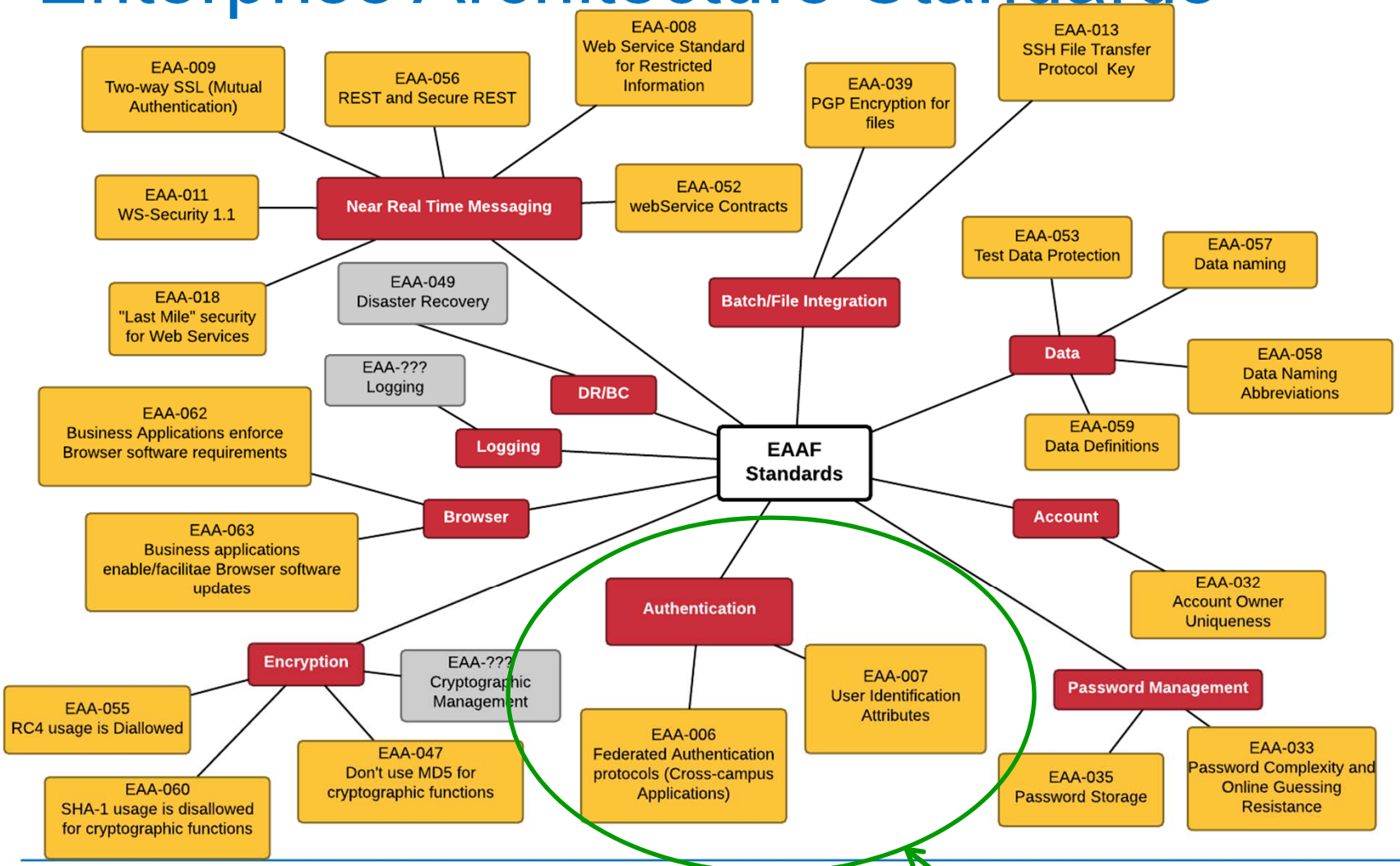
- UC IT Architecture Committee (ITAC)
  - Working sub-committee to the UC IT Leadership Council (ITLC)
  - Mission: "*establish the enterprise architecture and technology infrastructure necessary to promote and support interoperability and sharing of IT solutions among and between campuses*"
    - *Foundation for Collaboration on Technology Enabled UC Solutions, Pillar II*
  - Develops principles, standards and practices of Enterprise Architecture across UC
  - Facilitates knowledge sharing and collaboration across campuses.
  - Supports implementations of UC-wide initiatives through consultation and maintenance of EA Body of Knowledge

More on ITAC, Standards, Etc.

- Enterprise Architecture Body of Knowledge (EA BoK)
  - Repository of IT principles, standards, guidelines and other EA Artifacts (EAAs)
  - Reviewed by campus communities and adopted by CIOs
  - SAML for app authentication (EAA-006) is one of the standards
    - Formally adopted at more than half of campuses
    - De-facto standard via UCTrust (i.e., all campuses support this)

- UCTrust
  - Subcommittee of ITAC
    - Mission: *"provide input on design and implementation of identity management solutions for the UC system and to foster collaboration on IAM solutions among the campuses"*
  - Members provide direct support of SSO (Shibboleth) integration

Federated Authentication and UC Enterprise Architecture Standards



More info

- ITAC
  - UCCSC Presentation and overview
    - 3:00 Monday, Porter D246
  - Website
    - *https://spaces.ais.ucla.edu/display/ucitag/*

- UCTrust
  - Website
    - *https://spaces.ais.ucla.edu/display/uctrustwg/*

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Why “Shibboleth”?

…and it was so, that when those Ephraimites which were escaped said, Let me go over; that the men of Gilead said unto him, Art thou an Ephraimite? If he said, Nay; Then said they unto him, Say now **Shibboleth***: and he said* **Sibboleth***: for he could not frame to pronounce it right. Then they took him, and slew him at the passages of Jordan: and there fell at that time of the Ephraimites forty and two thousand…*

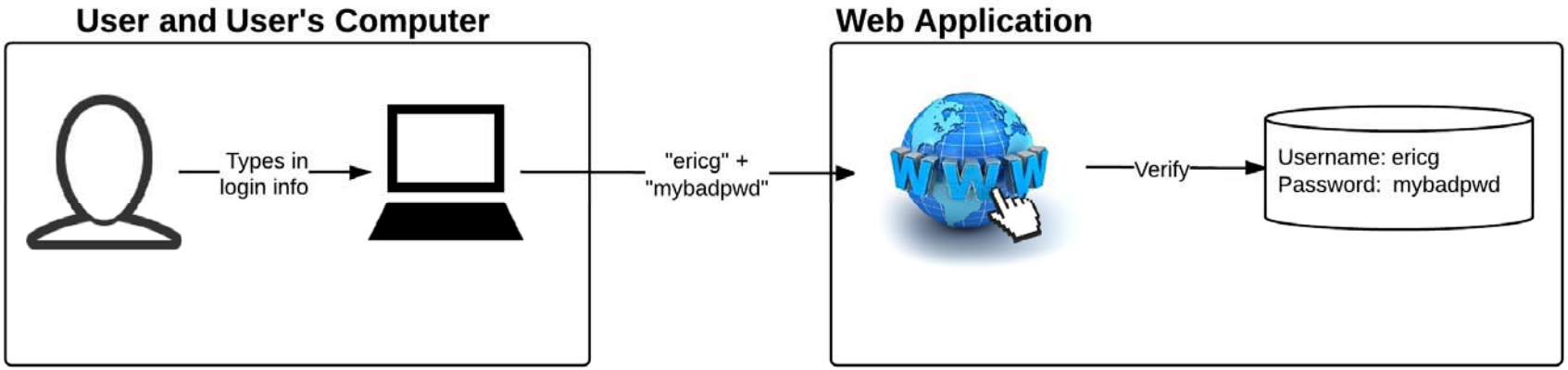
— Judges 12:5–6, *King James Bible*

Comparison of Authn Approaches

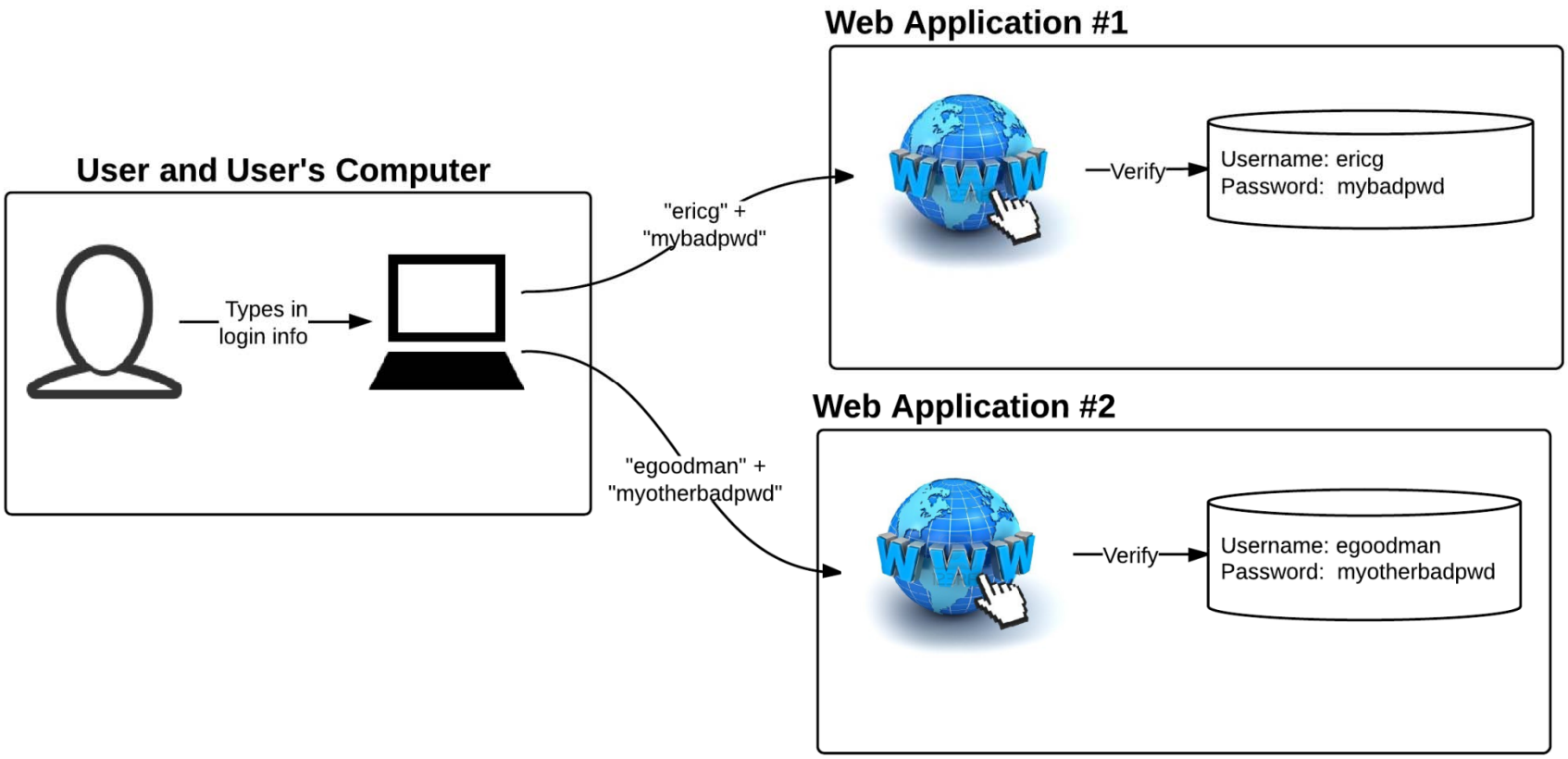
- Local authentication
- Pass-thru (proxy) authentication
- Authentication as a service

Local Authentication

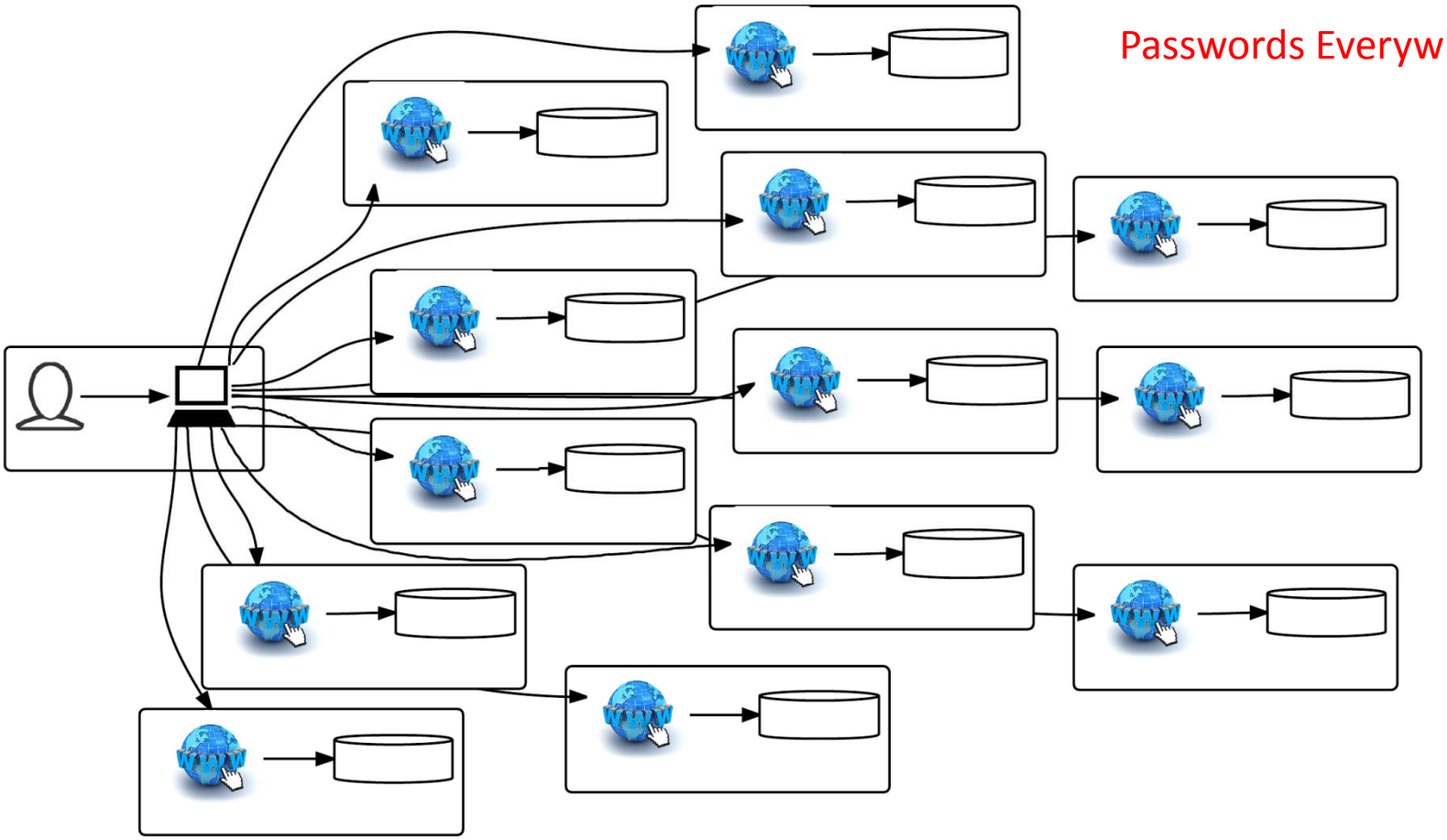
- Use application-specific passwords



Local Authentication



Local Authentication - Scaling



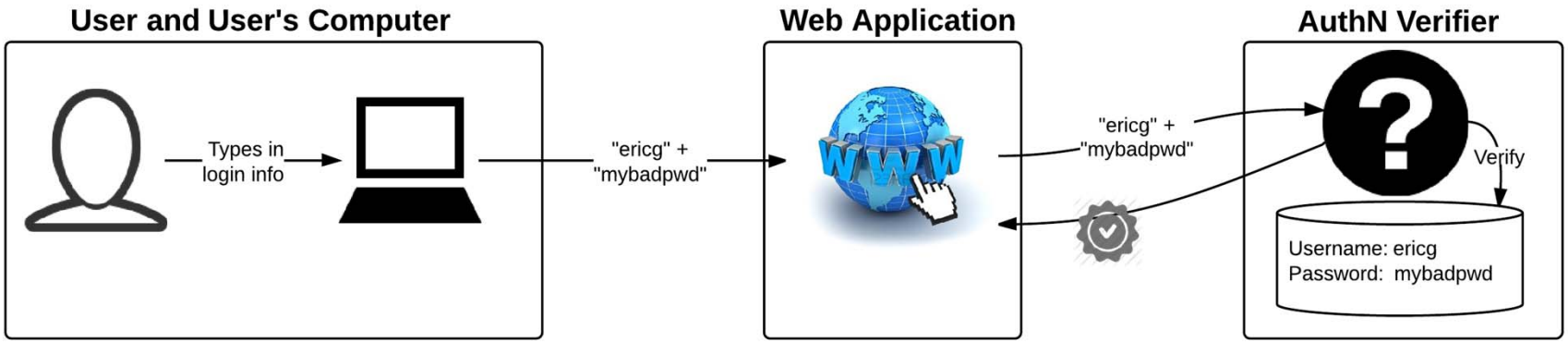
Passwords Everywhere!

Local Authentication

- Pros
  - Flexibility
    - Different usernames and passwords for each site
  - Simple to set up
- Cons
  - Usability
    - Different usernames and passwords for each site
    - Doesn’t integrate with anything else
    - Password changes are per-application
  - App must support password reset/I forgot my password
  - Security
    - Strong risk that users will reuse passwords
    - Passwords are confidential data and require extra security!

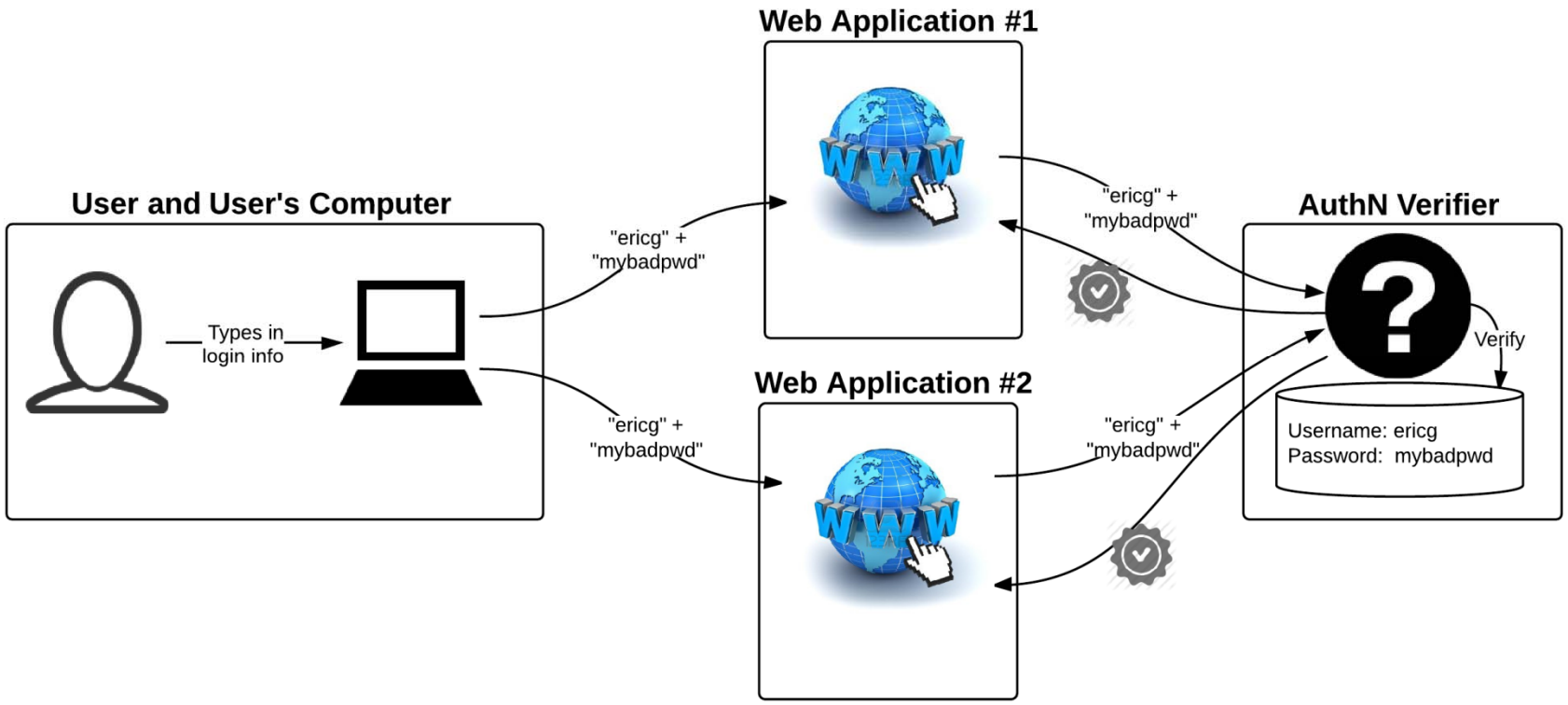
Pass-thru (proxy) Authentication

- Externalizes authentication
- Application impersonates user



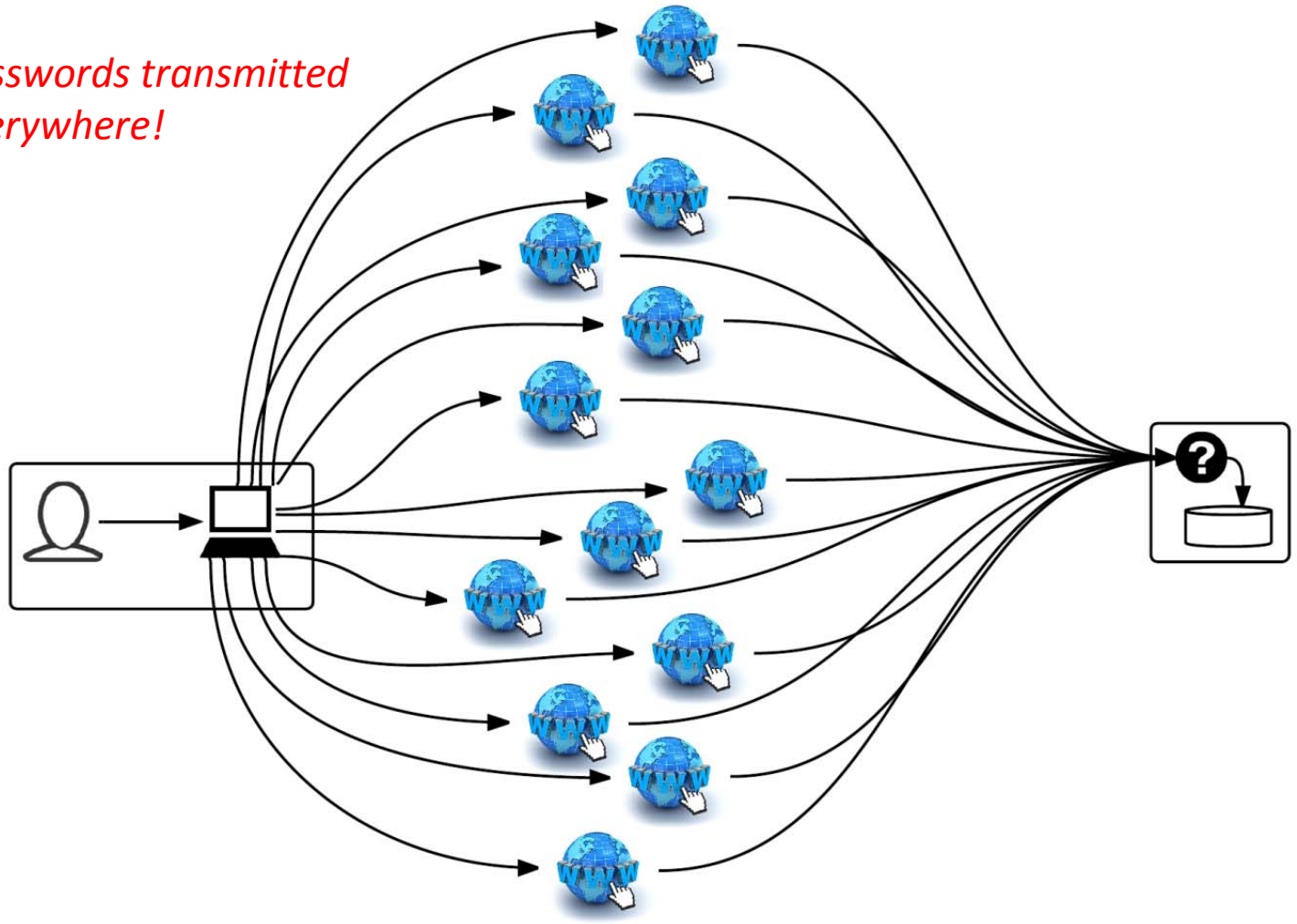
"Verifier" can be LDAP, AD, Kerberos, etc.

Pass-thru Authentication



Pass-thru Authentication - Scaling

Passwords transmitted everywhere!

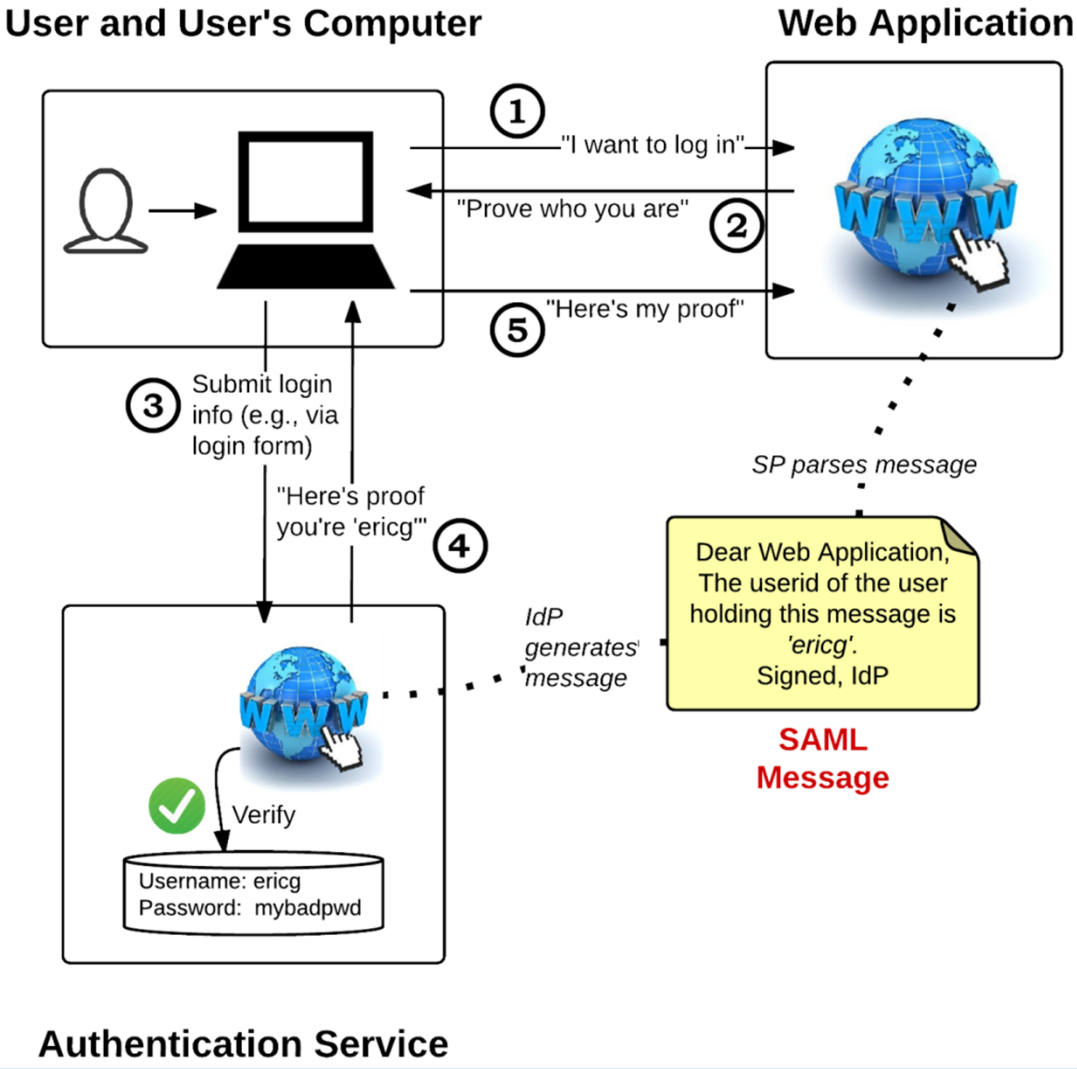


Pass-thru Authentication

- Pros
  - Same username password at each site
  - Single database for account/password changes

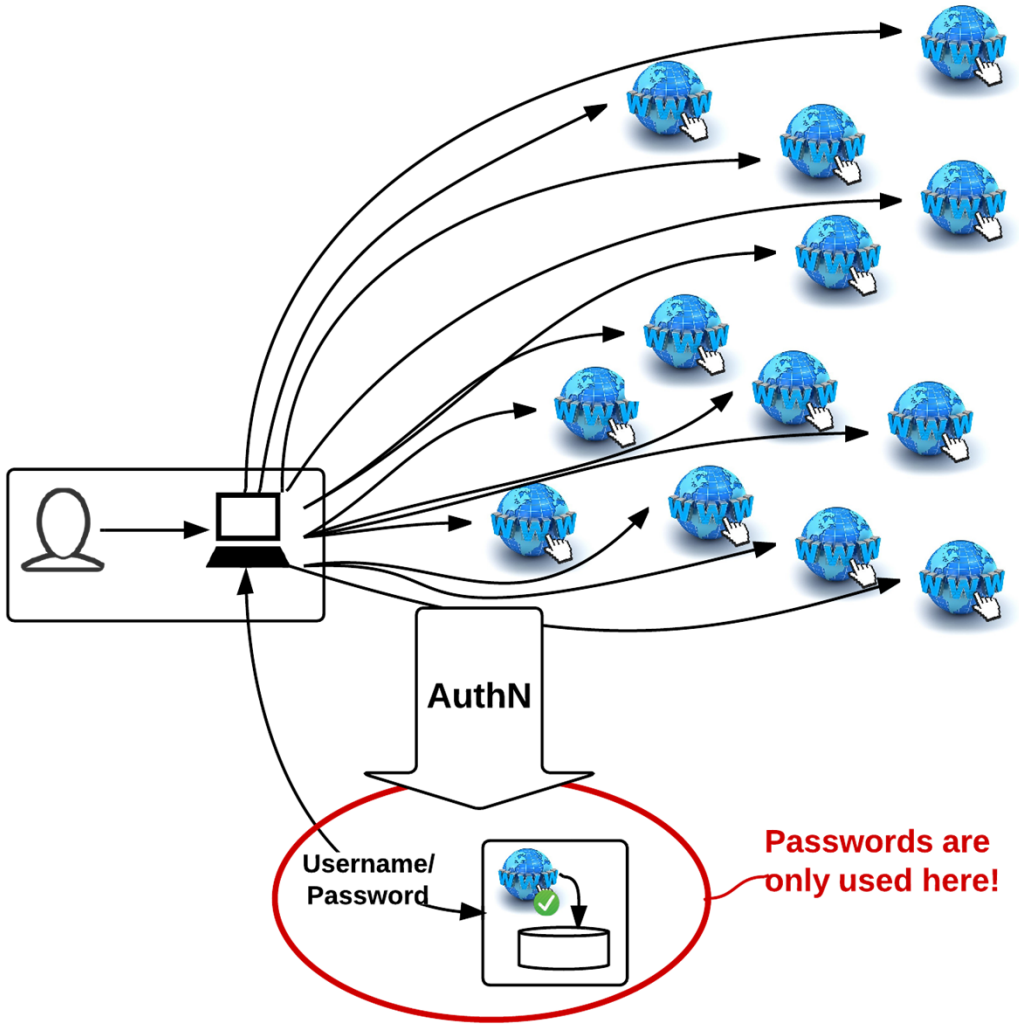
- Cons
  - Each app directly handles/transmits passwords
  - Trains users to enter UC password on any site
    - User has no way to validate website
  - Application *is* the user
    - AuthN service can't distinguish you and application

Federated Authentication



- Authentication as a service
- Uses the SAML protocol

Federated Authentication - Scaling



Federated Authentication

- Pros
  - A single, trusted application handles the passwords
  - Users always enter UC passwords on same website
  - Application sees approved user info, does not act “as user”
  - Authentication process handled centrally
    - Can leverage central services; multi-factor authentication, expired accounts
  - Single Sign On
  - Supports logins from multiple campuses without requiring new accounts
  - Easy to “Export”
    - E.g., safe to install and run in cloud environments (like AWS)

- Cons
  - Largely Web-Only
  - Complexity of initial install
  - Onboarding process at UC is currently “clunky”
  - Vendor adoption

Federated Authentication: SAML and Shibboleth

How it Works

Shibboleth components

- Identity Provider (IdP)
  - Run by the campus (organization)
  - Performs authentication (login)
  - Provides verifiable attributes describing user
- Service Provider (SP)
  - Run at the application level (“protected resource”)
  - Communicates with and validates info from IdP

Things to get used to with SAML

- IdP and SP don't directly communicate
  - AuthN info is shared via SAML messages
  - SAML messages are carried by user's browser
    - Encryption and signing are important!
- IdP does not control application session
  - Tells SP about the user being authenticated
  - After login/authentication is complete, IdP is done
    - SP session is managed locally
  - Means that "Logout" is a whole different animal
- SP does not control login process
  - Asks IdP to do authentication
  - AuthN UI/flow is managed by the IdP
  - The IdP provides the user data (including username)
    - SP must use/map the IdP's data for local profiles

Demo login (if time)

SAML Technical Notes

- Shibboleth SP software runs as a separate daemon/service
  - SP software maintains its own session
    - Application/web server can leverage session, but map to its own env
  - SP software translates SAML into http headers or web variables
  - Application reads SAML attributes to identify user
    - **$_SERVER[**"*attribute_name*"**];**
    - **request.getHeader(**"*attribute_name*"**);**
  - App can register users "on the fly" using this info
    - I.e., Create profile dynamically using IdP-provided information

- Other notes
  - Apps built from scratch are easy to integrate with Shibboleth
  - Third party apps can be more difficult depending on architecture
  - Applications that read REMOTE_USER generally integrate well
  - j2ee applications based on tomcat? use AJP if possible

SAML Attributes

eduPerson (InCommon/Internet2) Attributes
eduPersonAffiliation
eduPersonEntitlement
eduPersonNickname
eduPersonOrgDN
eduPersonOrgUnitDN
eduPersonPrimaryAffiliation
eduPersonPrimaryOrgUnitDN
eduPersonPrincipalName
eduPersonScopedAffiliation
eduPersonTargetedID

UCTrust Attributes
UCNetID
UCTrustAssurance
UCCampusEmployeeID
UCTrustShortCampusID (deprecated)
UCPathEmplid
UCCampusStudentId
UCEmployeeStatus???
UCStudentGradeLevel???

Local Attributes (campus specific)
CruzID (UCSC)
FacultySystemID (hypothetical)

Using SAML in an App

- Install Shibboleth SP software (shibd)
  - Official RPMs/Installers
    - RHEL, CentOS, SUSE, Windows
  - Unofficial
    - (Li/U)nux systems, MacOS (MacPorts), Java Servlets

- Configure web server
  - Apache
    - Load module (mod_shib)
    - Protect content using normal “Location” directives
  - IIS
    - Enable ISAPI filter (isapi_shib.dll)
    - Protect in “shibboleth2.xml” using shibboleth config syntax

Using SAML in an App

- Configure Shibboleth Software
  - shibboleth2.xml
    - Controls shibboleth options (config, basic settings)
    - Protection directives for IIS must go here
      - Uses a Shib-specific syntax
  - attribute-map.xml
    - Maps SAML attributes to variables/headers
  - Protection directives (Apache only)
    - Via standard <Location /> style configs

Configuring Shibboleth

- Set entityID in ApplicationDefaults

```
<ApplicationDefaults
  entityID="https://idm-test-sp.ucsc.edu/shibboleth"
  REMOTE_USER="eppn persistent-id targeted-id">
```

- For https, change this in Sessions section

```
<Sessions lifetime="28800" timeout="3600" relayState="ss:mem"
  checkAddress="false" handlerSSL="true" cookieProps="https">
```

Configuring Shibboleth (cont)

- Load Metadata (the config. info for campus IdPs)

```
<MetadataProvider type="XML"
  uri="http://md.incommon.org/InCommon/InCommon-metadata.xml"
  backingFilePath="incommon-metadata.xml“
  reloadInterval="7200">
</MetadataProvider>
```

- Identify login service?

```
<SSO discoveryProtocol="SAMLDS"
  discoveryURL="https://wayf.incommonfederation.org/DS/WAYF">
          SAML2 SAML1
</SSO>
```

Using SAML in an App

- Test with local campus IdP
  - May require loading local campus IdP configuration
  - May require configuration of campus IdP (by local IdM team)
  - Process varies, work with your campus contact:
    https://spaces.ais.ucla.edu/display/uctrustwg/UCTrust+Campus+Contacts

- Register application with InCommon
  - InCommon provides a registry of verified SP/IdP config info
    - Called Metadata
  - Shibboleth automatically loads/updates configs from InCommon
  - Work with campus contact to list your app in InCommon

- Work with campus contact to integrate with other campuses
  - Request appropriate attributes

Vendors and SAML

- SAML support is frequently minimal
  - Vendors don't always use Shibboleth (the app)
  - Vendors may require manual configuration of IdP info
    - Rather than Shib's auto config via InCommon metadata
  - Some vendors are limited to one campus (IdP)
  - "SAML Proxy" service may help
    - Available via UCOP for UC applications
- "SSO" does not always mean "SAML"
  - Can mean "we integrate with AD (or LDAP)"
    - I.e., Pass-thru or proxy authentication
    - Not what we use at UC for systemwide apps
  - Include SAML support in initial plans and RFPs

Question & Answer

For further questions

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