



UH Applications Developers Meeting 10/30/2015

Today's slides are available online

<http://go.hawaii.edu/w>

Presenters

In order of appearance

- **Dr. Philip Johnson**, UHM, ICS
- **Jennifer Geis**, ITS, MIS
- **Craig Spurrier**, KCC, CELT
- **Julio Polo**, ITS, Middleware/IAM
- **Michael Hodges**, ITS, Middleware/IAM



Agenda

- **Presentation:** Publishing UH Projects to GitHub (Philip)
- **Presentation:** Native iOS CAS Authentication (Jennifer)
- **Presentation:** Invoking CAS from a PhoneGap based hybrid App (Craig)
- **Update:** UH Groupings (Julio)
- **Quick Topics** (Michael)
- **Snacks:** And an opportunity to meet colleagues





INFORMATION & COMPUTER SCIENCES

UNIVERSITY of HAWAII at MĀNOA

ITS: Please start using GitHub

A plea from the UH Community

Philip Johnson

Professor, Information and Computer Sciences

johnson@hawaii.edu

What isn't ITS?

- ITS is not a software development company.
- Its mission does not include the development of patentable intellectual property.
- ITS has no reason not to strive to incorporate contributions from the substantial number of high tech developers at UH.

Collaboration Opportunities

- Scripts for manipulating UH data
- Sample programs for accessing UH services
- UH branded WordPress themes and plugins
- Scripts for setup, access, management of ITS virtual servers

Why GitHub?

- Currently the best cloud-based suite of tools for collaboratively developed source and documentation management.
- It's free.
- Great documentation, active development
- Minimal vendor lock-in

Example: OPQ

- OpenPowerQuality is a GitHub “organization”.
- An organization can:
 - Own multiple repositories to manage source code
 - Provide a (GitHub hosted) static website to document the organization.
- Each repo can also have its own (GitHub hosted) static website for documentation

Home | Open Power Quality x Philip

openpowerquality.org

Open Power Quality Home Technology Organization Discussion News

Welcome to Open Power Quality


Open source hardware, software, and data for low cost, crowd-sourced power quality monitoring, storage, and analysis

Designed for utilities, campuses, renewable energy providers, power specialists, consumers, and anyone else who wants increased use of renewable energy sources.

Our target users include macro-grid providers (electrical utilities), micro-grid providers (military, academia, and large corporations), renewable energy providers, power quality specialists, and even everyday consumers interested in their power quality.

See the [community](#) page for more details on these user groups.

Our ultimate goal is to help society move from reliance on fossil fuels to more efficient, robust, and renewable energy sources.

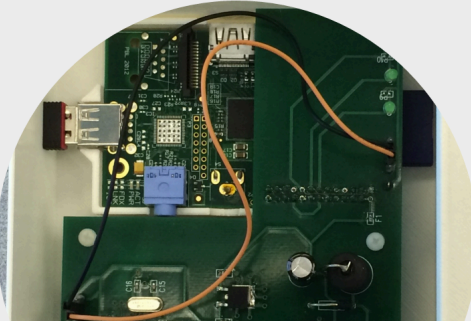


OPQBox: Low cost, open source hardware

Our first generation OPQBox costs less than US\$75, and the schematics are published under an open source hardware license if you want to build it yourself.

We want to create and support an ecosystem of hardware developers that accelerate the development of new designs to satisfy different needs.

Our first generation design is based upon a Raspberry Pi. Our second generation OPQBox will decrease the cost and size, and increase the functionality. Come help us invent the future of power quality monitoring!



Philip

openpowerquality.org/opqbox2/

View on GitHub

OPQBox2

Second generation open power quality measurement device

tar.gz .zip

Overview

The mission of the Open Power Quality project is to design and implement open source hardware, software, and data for low cost, crowd-sourced power quality monitoring, storage, and analysis. For more details, please see our [home page](#).

This repository provides the proposed schematics for the second generation Open Power Quality metering device (OPQBox2).

OPQBox2 is in the final design stage. We are circulating this design to solicit feedback and make improvements prior to production. We greatly appreciate your willingness to provide us with feedback.

Goal

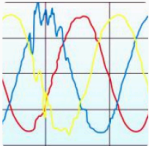
The goal of OPQBox is to monitor voltage and frequency and detect departures from nominal levels. It accomplishes this by sampling the waveform 256 times per cycle, extracting power quality measures (including frequency, RMS voltage, and THD), and then uploading data about these measures to the OPQHub service.

OPQBox can be configured to send a "heartbeat" message to OPQHub to indicate that it is connected and functioning. This message normally includes low resolution voltage and frequency data.

Open Power Quality x Philip

← → ↻ 🏠 **GitHub, Inc. [US]** <https://github.com/openpowerquality> ☆ 🔄 🗨️ ⓘ JB 👤 📈 ☰

🔍 Search GitHub Pull requests Issues Gist 🔔 + 👤



Open Power Quality

📍 Honolulu, HI 🌐 <http://openpowerquality.org> ✉️ openpowerquality@gmail.com

📁 **Repositories** 👤 People 5 📁 Teams 3 ⚙️ Settings

Filters ▾ 🔍 Find a repository... + New repository

opqhub2 Python ★ 0 📄 0

OPQHub in Meteor
Updated 25 days ago

openpowerquality.github.io HTML ★ 0 📄 0

Home site for open power quality organization.
Updated on Sep 22

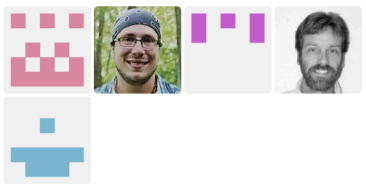
opqbox2 Game Maker Language ★ 0 📄 0

OPQBox (Generation 2)
Updated on Sep 9

opqview2 ★ 0 📄 0

Human user interface to OPQ System.

People 5 >



Invite someone

openpowerquality/openpow x Philip

← → ↻ 🏠 [GitHub, Inc. \[US\] https://github.com/openpowerquality/openpowerquality.github.io](https://github.com/openpowerquality/openpowerquality.github.io) ☆ 🔌 🗨️ ⓘ JB 👤 📈 ☰

This repository Search Pull requests Issues Gist 🔔 + 👤

openpowerquality / openpowerquality.github.io 👁️ Unwatch 5 ★ Star 0 🍴 Fork 0

Home site for open power quality organization. <http://openpowerquality.github.io> — Edit

📄 61 commits 🌿 2 branches 📦 0 releases 👤 2 contributors

🔄 Branch: master openpowerquality.github.io / + ☰

philipmjohnson	Update news and links	Latest commit e08deca on Sep 22
📁 2014	Update news and links	a month ago
📁 2015	Update news and links	a month ago
📁 css	Fixing?	8 months ago
📁 images	Fixing up join us page	a month ago
📁 js	Initial commit	a year ago
📁 organization	Update news and links	a month ago
📁 technology	Update news and links	a month ago
📄 CNAME	Fixing?	8 months ago
📄 favicon.ico	Fixing?	8 months ago
📄 feed.xml	Update news and links	a month ago
📄 index.html	Update news and links	a month ago

🔗 **SSH** clone URL
git@github.com:ope

You can clone with [HTTPS](#), [SSH](#), or [Subversion](#). ☺

Clone in Desktop

Download ZIP

Help people interested in this repository understand your project by adding a README. ➤ Add a README

openpowerquality/opqbox2 x Philip

← → ↻ 🏠 GitHub, Inc. [US] <https://github.com/openpowerquality/opqbox2> ★

This repository Search Pull requests Issues Gist 🔔 + 👤

openpowerquality / **opqbox2** 5 0 0

OPQBox (Generation 2) <http://openpowerquality.github.io/opqbox2> — Edit

Branch: master ▾ **opqbox2 / +**

Add engineering sample Latest commit 6966585 on Sep 9

	Updates to readme.md for section phase of design.	11 months ago
	Deleted temporary files created by PADs	2 months ago
	Merge branch 'master' of https://github.com/openpowerquality/opqbox2	2 months ago
	Cleaning Up	a year ago
	Add engineering sample	2 months ago

README.md

Overview

The mission of the Open Power Quality project is to design and implement open source hardware, software, and data for low cost, crowd-sourced power quality monitoring, storage, and analysis. For more details, please see our [home page](#).

This repository provides the proposed schematics for the second generation Open Power Quality metering device (OPQBox2).

OPQBox2 is in the final design stage. We are circulating this design to solicit feedback and make

<> Code

- 15
- 0
-
-
-
-

SSH clone URL

`git@github.com:ope`

You can clone with [HTTPS](#), [SSH](#), or [Subversion](#).

How I would do it

- Create a “top-level” organization: “uhm-its”.
- This contains just the code for a static website (<http://uhm-its.github.io>) that documents all the ITS GitHub organizations for specific areas.
- Create additional organizations as needed:
 - uhm-its-virtual-servers
 - uhm-its-wordpress
 - uhm-its-cas
 - etc

Things to think about

- What (open source) licenses to attach.
- How to document services
- What workflow (pull requests? Collaborators with push privileges?) etc.

Questions?



Philip Johnson

Professor, Information and Computer Sciences
johnson@hawaii.edu



Native iOS CAS Authentication

Jennifer Geis

MIS, Management and Information Systems

Why?

- App and webservice need authenticated user, want SSO.
- No browser needed, authentication is done directly in the app.
- Just to see if I could.

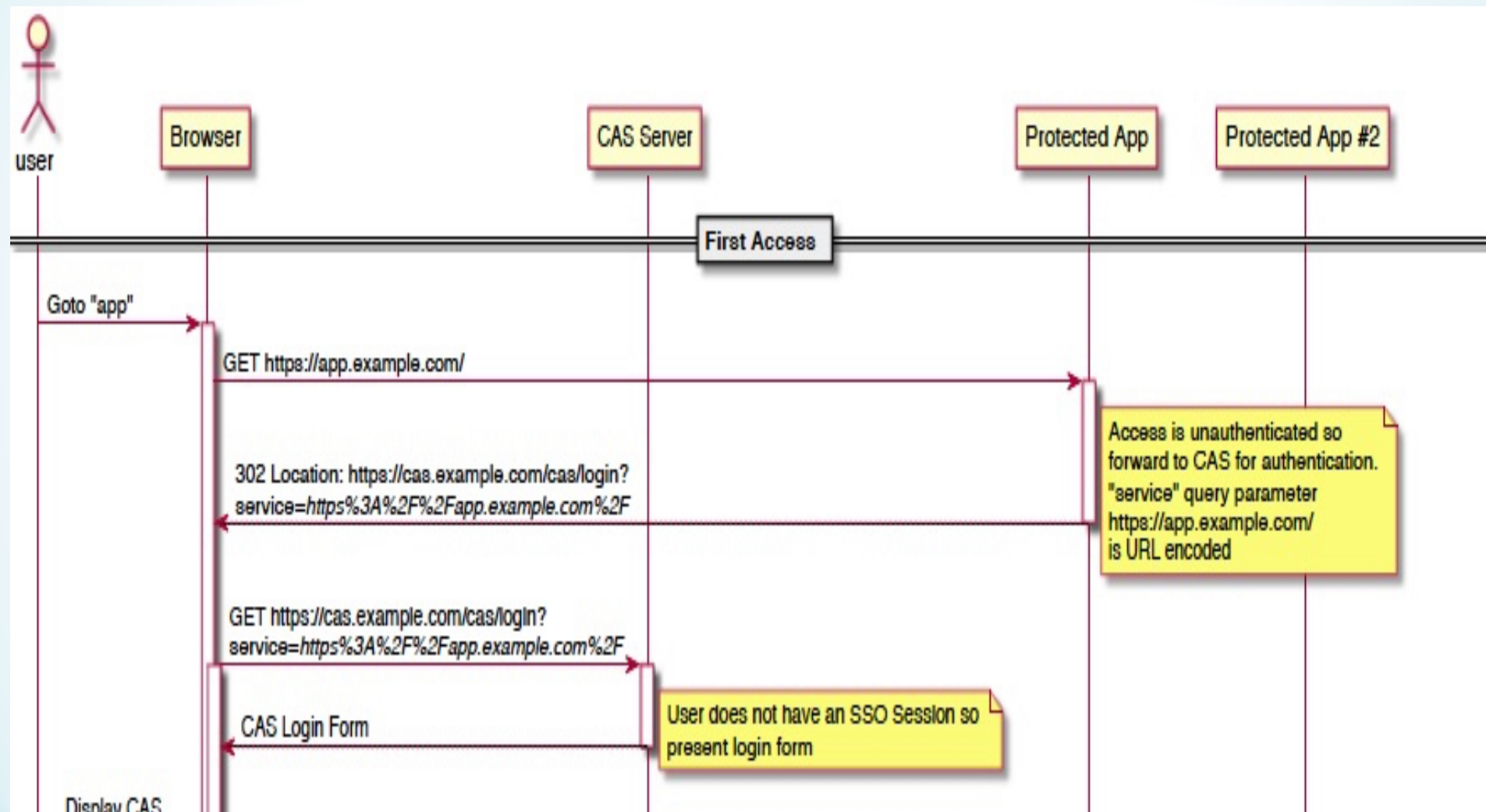


Why Not?

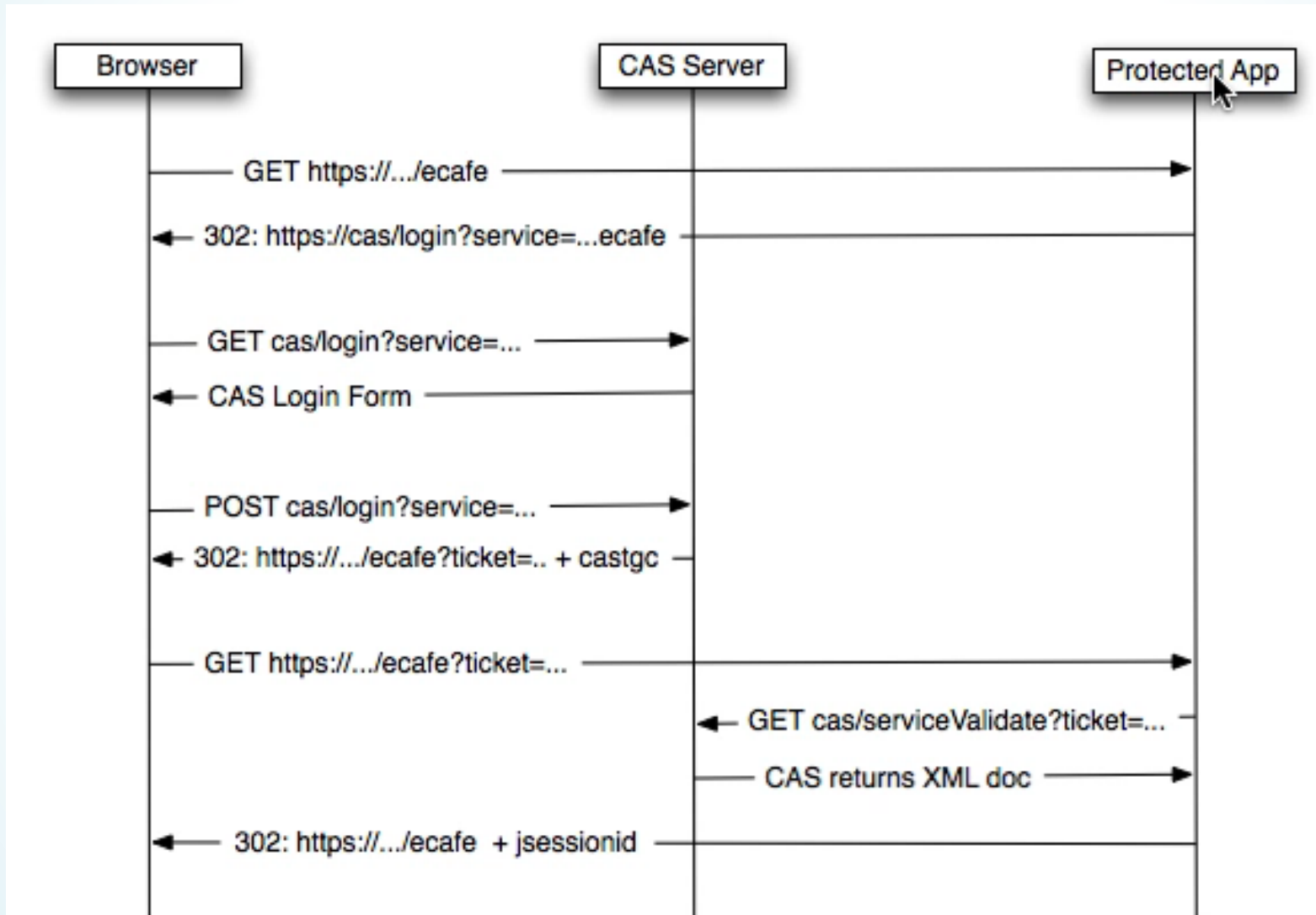
- Messy
- Brittle
- Shibboleth
- Consider writing your app in another language that compiles to native code.



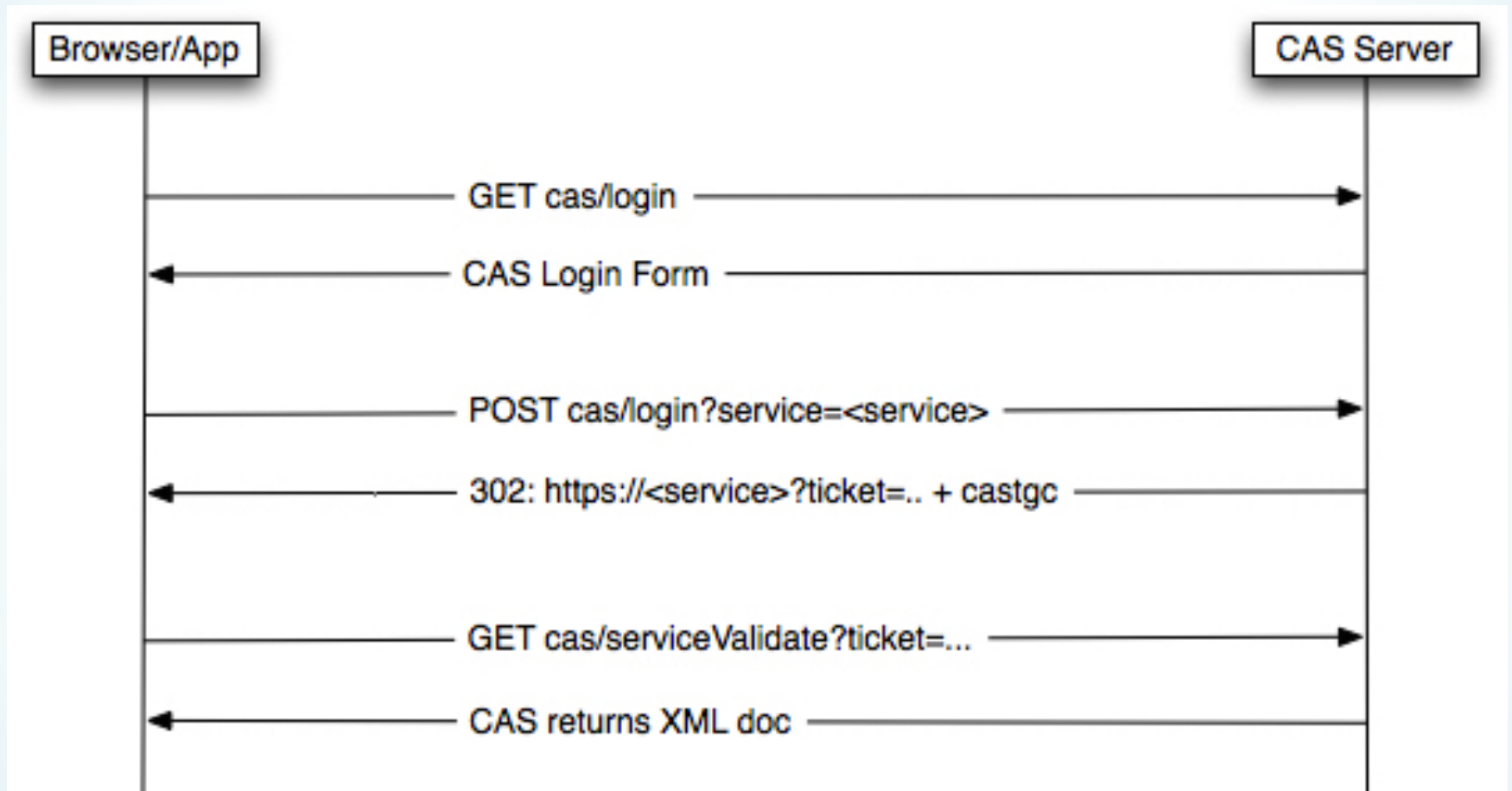
How CAS Normally Works



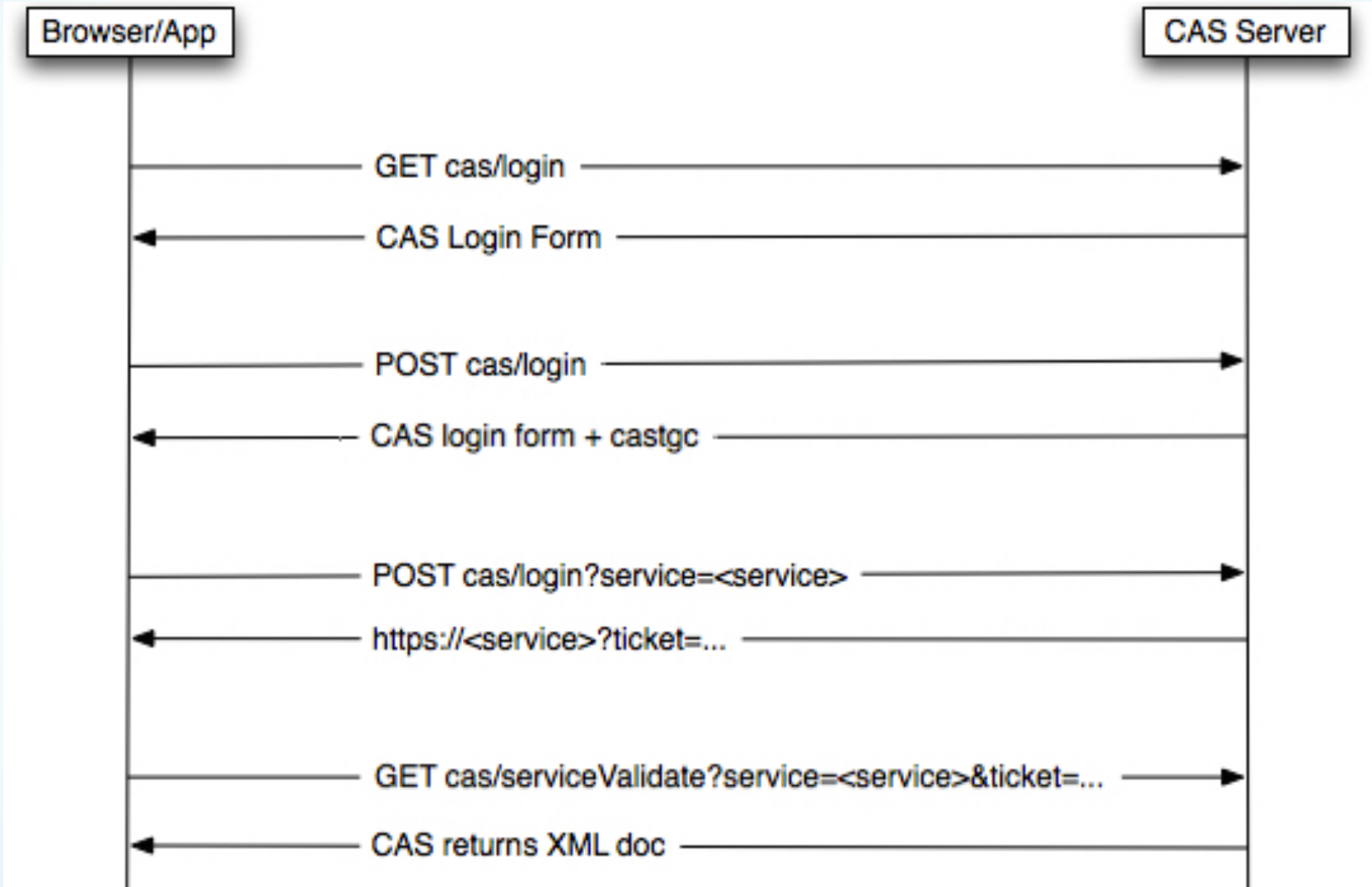
How CAS works



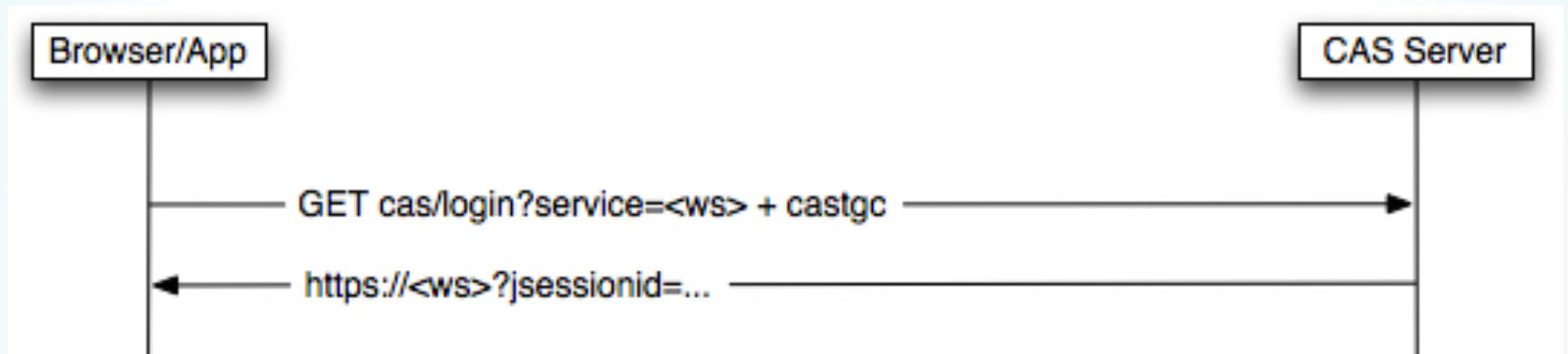
How CAS Works In An App



How CAS Works In An App



SSO to WebService



The Details

1. Do a GET on CAS (<https://cas-test.its.hawaii.edu/cas/login>) and parse Login Ticket, execution, and eventId out of response body.
2. POST to the same URL with username, password, login ticket, execution, and eventId in the body.
3. Get the CASTGC (Ticket Granting Cookie) off the response.
4. POST to the same URL again, including everything in step 2, plus an encoded service parameter ([service=http%3A%2F%2Flocalhost%3A8080%2FcafeMobile](http://localhost:8080/cafeMobile)).
5. Get the service ticket off the response URL. (<http://localhost:8080/cafeMobile?ticket=ST-ABC-WQ6FgBOexKuhG0SIErF2-cas>)

The Details (continued)

6. Hit the CAS validate URL, provide the encoded service and the service ticket.

<https://cas-test.its.hawaii.edu/cas/serviceValidate?service=http%3A%2F%2Flocalhost%3A8080%2FcafeMobile&ticket=ST-ABC-WQ6FgBOexKuhG0SIErF2-cas>

7. Look at the response body to hopefully find authentication success.
8. For SSO to your WS, GET the CAS login one more time, providing only your web service as your service and including the CASTGC.



Questions?



Jennifer Geis
jgeis@hawaii.edu

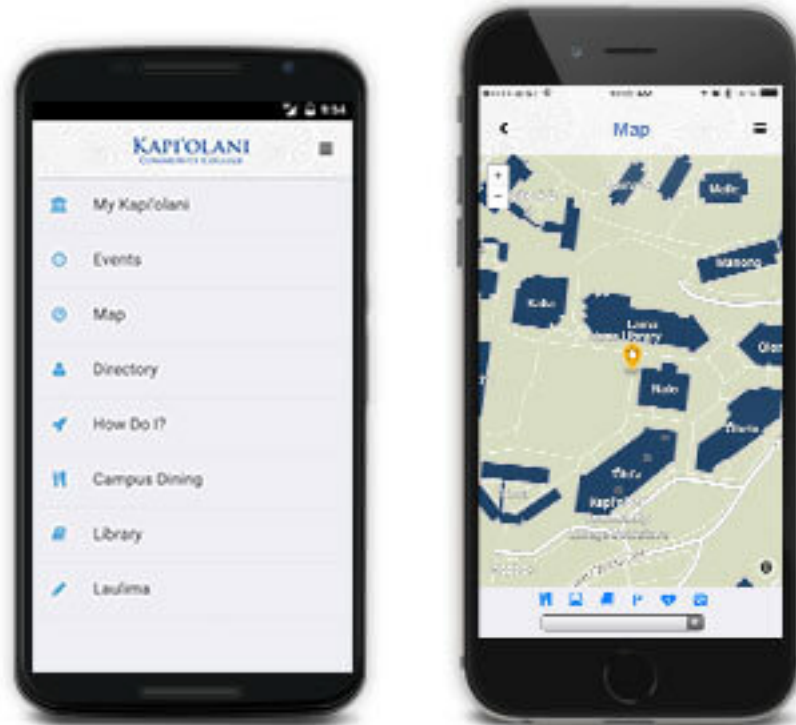
Hybrid Mobile Apps and CAS

Craig Spurrier

Programmer

CELTT @ Kapi'olani Community College

Our App



The Kapi'olani Community College – Mobile App

App Challenges

- Short timeframe
 - Started development in March 2015
 - Launched August 2015
- Support for iOS and Android from day 1
 - Windows Phone support desired
- I don't like Java :)

PhoneGap

PhoneGap is an open source framework that allows you to build native apps using HTML, CSS, and JavaScript



Phone**Gap**

PhoneGap Platforms

Supports iOS, Android, Windows, BlackBerry and more



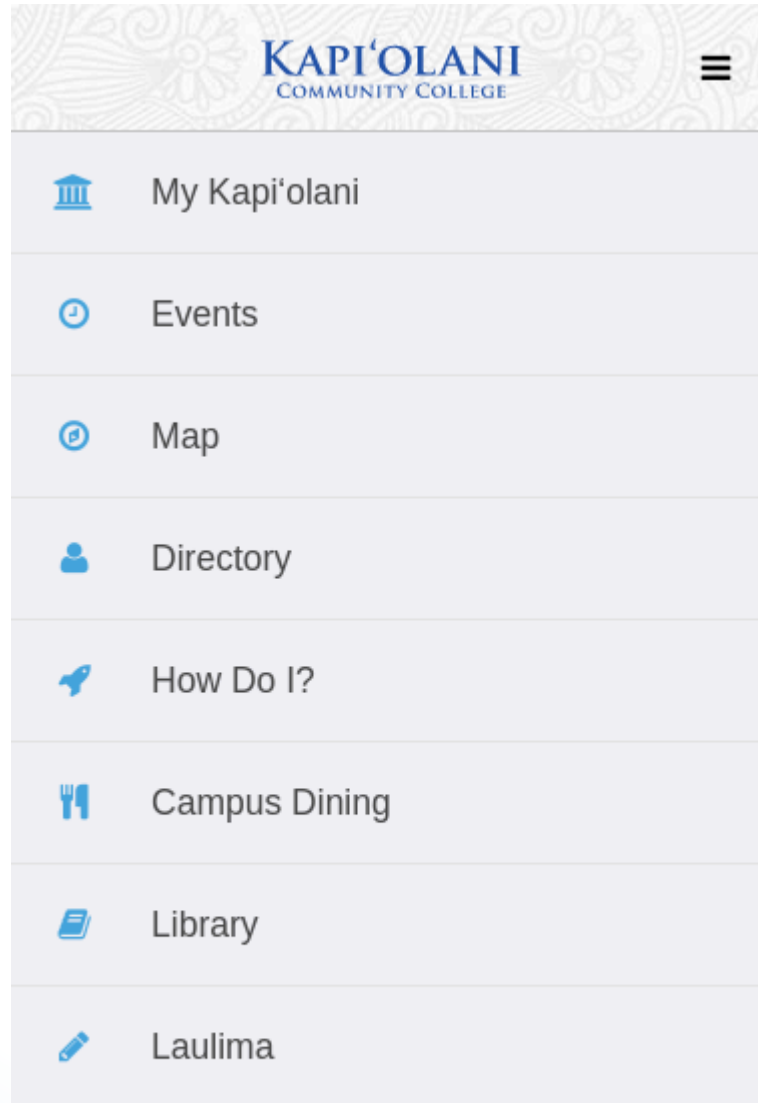
iOS
webOS

Android
symbian

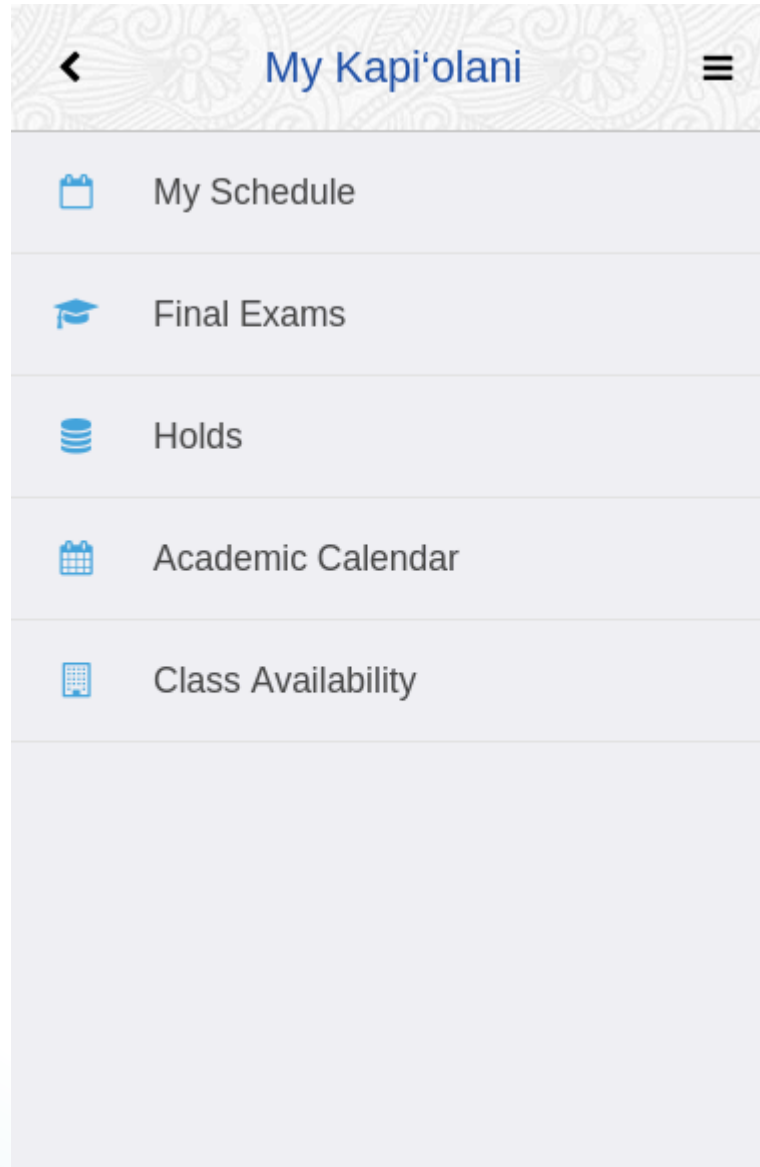


BlackBerry
bada

App Features



My Kapi'olani (Why we need CAS)



My Kapi'olani (Why we need CAS)

The screenshot shows the 'My Schedule' screen for Fall 2015. It features a header with a back arrow, the title 'My Schedule', and a menu icon. Below the header is a sub-header for 'Fall 2015' with left and right navigation arrows. The main content area lists four courses, each with its title, time, days, and location.

My Schedule

Fall 2015

- ARCH 100: Intro to the Built Environment**
11:30p-12:45a
Monday // Wednesday
ARCH 205 (Mānoa Campus)
- ARCH 101: Basic Design Studio**
1:30p-5:30p
Tuesday // Thursday
ARCH 210 (Mānoa Campus)
- HIST 151: World History to 1500**
3:15p-4:30p
Monday // Wednesday
Olona 205
- MATH 135: Precalc: Elementary Functions**
TBA
TBA
WWW

The screenshot shows the 'Holds' screen. It features a header with a back arrow, the title 'Holds', and a menu icon. The main content area lists three types of holds, each with its title and contact information.

Holds

- Academic Advising Hold**
Mandatory Transfer Advising
KapCC TYE Program 734-9676
- MMR Clearance Hold**
no record for spring 15
KapCC Admiss&Records 734-9555
- TB Clearance Hold**
no record for spring 15
KapCC Admiss&Records 734-9555

Authentication Process

App opens an iframe
page on app server

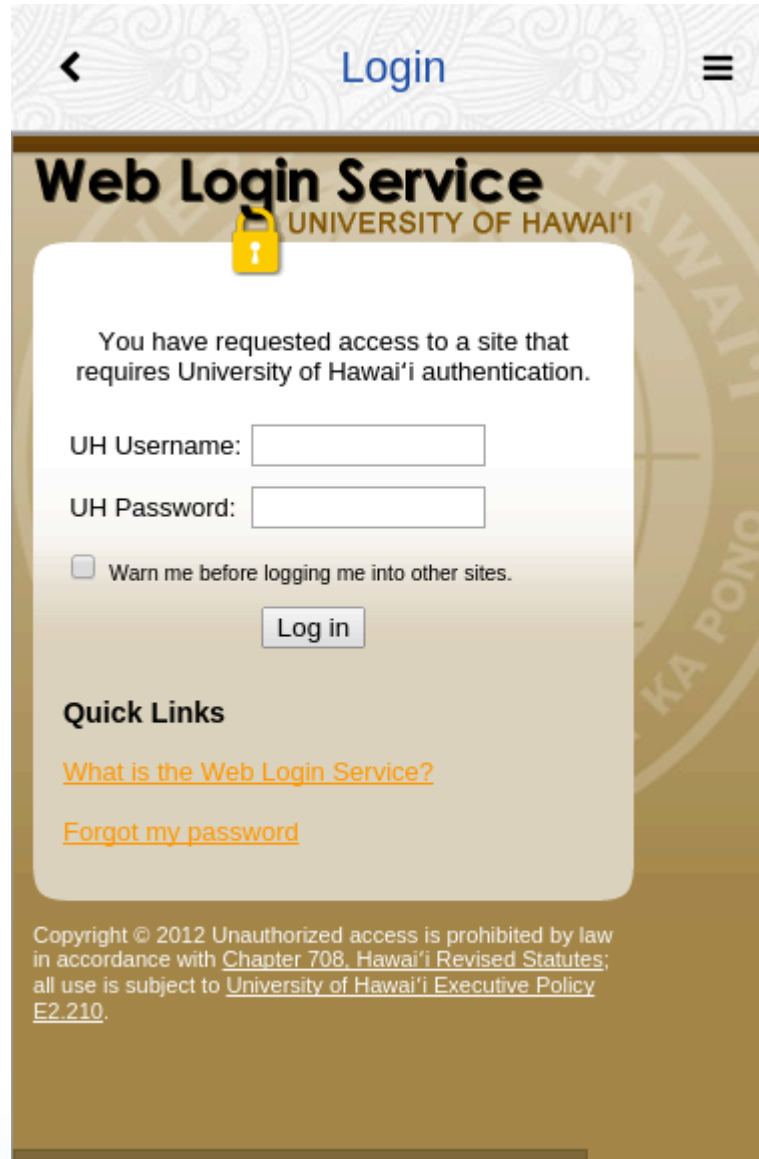
Server serves the CAS login
using standard PHPCAS

On successful login, it
returns the UHID and a
server generated token

The UHID and token is
saved on the device

UHID and token are used to
authenticate each API call

CAS (UI)



The screenshot shows a mobile application interface for the University of Hawai'i Web Login Service. At the top, there is a navigation bar with a back arrow, the word "Login", and a menu icon. Below this is a header section with the text "Web Login Service" and "UNIVERSITY OF HAWAI'I". A yellow padlock icon is positioned above the main content area. The main content area contains a message: "You have requested access to a site that requires University of Hawai'i authentication." Below this message are two input fields: "UH Username:" and "UH Password:". There is also a checkbox labeled "Warn me before logging me into other sites." and a "Log in" button. Below the login fields is a "Quick Links" section with two links: "What is the Web Login Service?" and "Forgot my password". At the bottom of the page, there is a copyright notice: "Copyright © 2012 Unauthorized access is prohibited by law in accordance with Chapter 708, Hawai'i Revised Statutes; all use is subject to University of Hawai'i Executive Policy E2.210."

iframe within
the App

CAS (Backend - App HTML)

```
1 |<!-- Top Navbar-->
2 |<div class="navbar">
3 |  <div class="navbar-inner">
4 |    <div class="left">
5 |      <a href="#" class="back link icon-only">
6 |        <i class="fa fa-chevron-left"></i>
7 |      </a>
8 |    </div>
9 |    <div class="center sliding">Login</div>
10 |   <div class="right">
11 |     <a href="#" class="link icon-only open-panel"><i class="fa
12 | fa-bars"></i></a>
13 |   </div>
14 | </div>
15 | <div class="pages">
16 |   <div data-page="login" class="page">
17 |     <div class="page-content">
18 |       <div class="content-block">
19 |         <iframe src=
20 | "https://celtt01.kapiolani.hawaii.edu/auth/index.php" id=
21 | "login_iframe">
22 |           <i class="fa fa-cog fa-spin"></i>
23 |         </iframe>
24 |         <div id='token'></div>
25 |       </div>
26 |     </div>
27 |   </div>
28 | </div>
```

CAS (Backend - Server)

```
1 <?php
2 require __DIR__ . '/vendor/autoload.php';
3 require('../config.php');
4
5 // Initialize phpCAS
6 phpCAS::client( SAML_VERSION_1_1, 'authn.hawaii.edu', 443, '/cas/' );
7
8 // force CAS authentication
9 phpCAS::forceAuthentication();
10
11 $uh_id = phpCAS::getAttribute('uhUuid');
12 $username = phpCAS::getUser();
13 use IcyApril\CryptoLib;
14 $token = CryptoLib::randomString(16);
15
16 $session = ORM::for_table('sessions')->create();
17 $session->uh_id = $uh_id;
18 $session->token = $token;
19 $session->active = '1';
20 $session->created = date ("Y-m-d H:i:s");
21 $session->last_login = date ("Y-m-d H:i:s");
22 $session->save();
23
24 echo "<script>
25 parent.postMessage(";
26 echo json_encode(Array('uh_id'=>$uh_id, 'token'=>$token, 'username'=>$username, 'r'=>
27     htmlspecialchars($_GET['r'])));
28 echo ", '*')";
29 </script>";
30 echo "Logged in";
```

CAS (Backend - App JS)

```
1 function load_login(action,r){
2     $(window).bind('onmessage',receive_login);
3     $(window).bind('message',receive_login);
4 }
5
6 function receive_login(event){
7     if(event.originalEvent.origin !==
8     'https://celtt01.kapiolani.hawaii.edu') return;
9     uh_id = event.originalEvent.data.uh_id;
10    username = event.originalEvent.data.username;
11    token = event.originalEvent.data.token;
12    login_link();
13    console.log('Logged in as '+uh_id);
14    if (event.originalEvent.data.r == 'undefined') {
15        load_page('index.html');
16    }else{
17        load_page(decodeURIComponent(event.originalEvent.data.r));
18    }
19 }
```

Status of Our App

Launched August 18th at Kapi'olani

iOS

808 installs

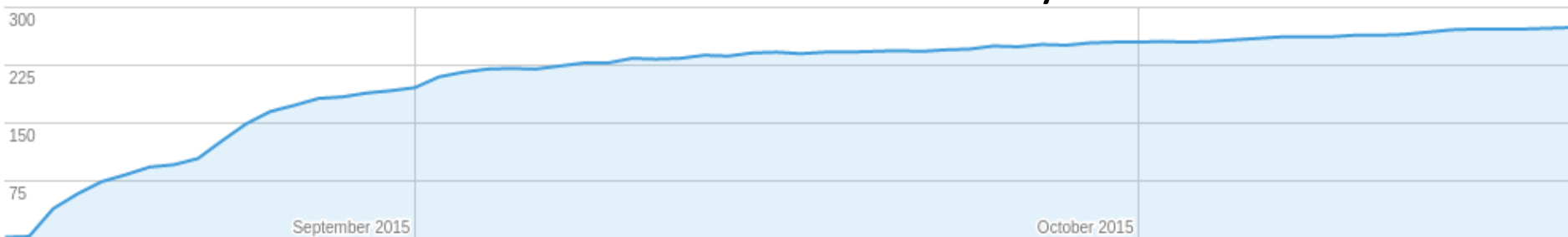


android

289 installs



~14% of our student body



Status of Our App

Logins

731 unique UH ids

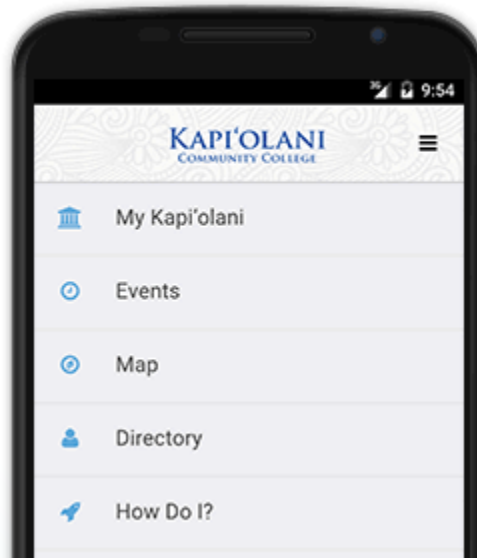
About 200 per week

Total Logins

6,997



The Kapi'olani Community College – Mobile App



Questions?



Craig Spurrier

Programmer

CELTT @ Kapi'olani Community College

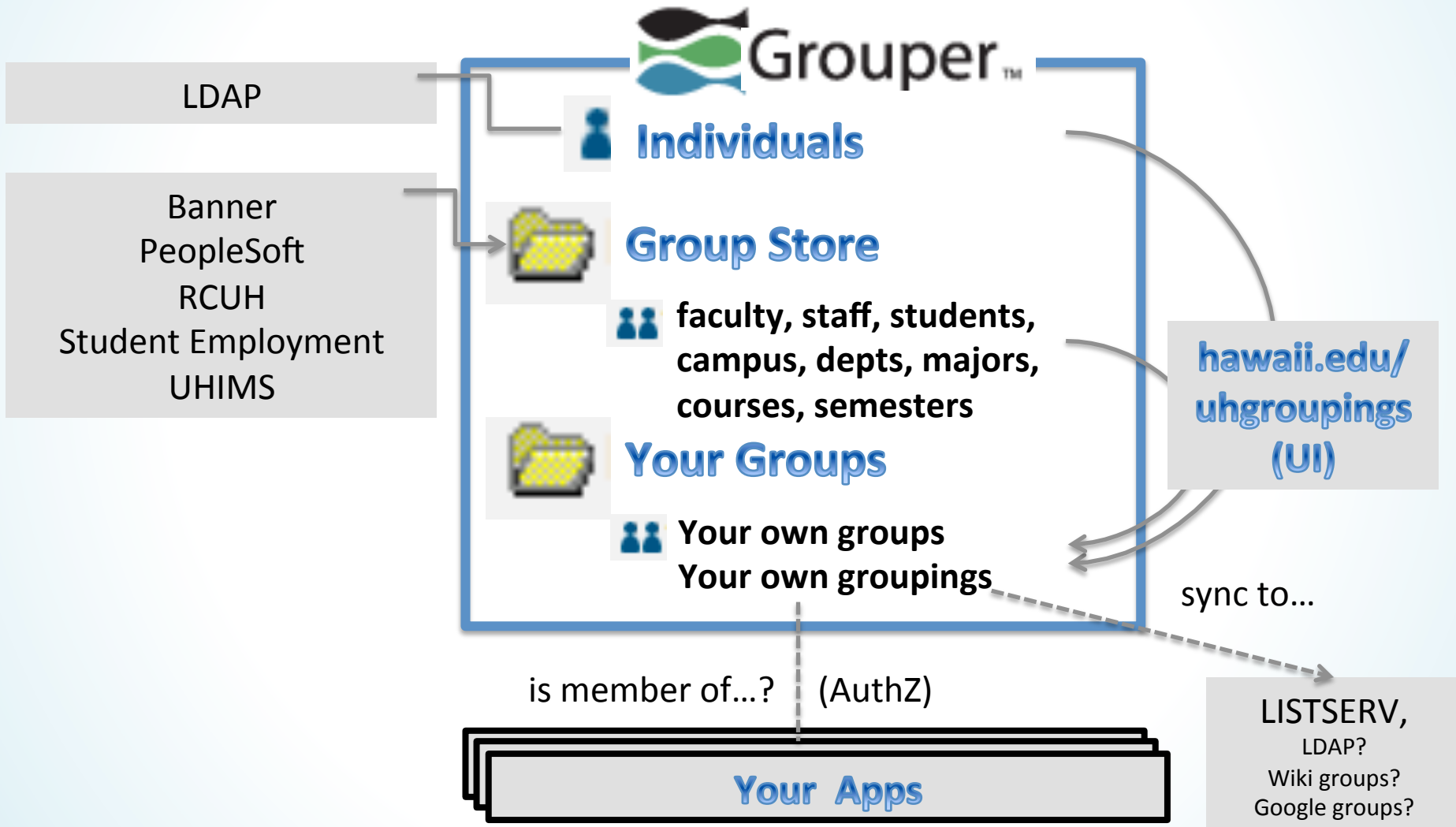
UH Groupings Update

October 30, 2015

Julio Polo

Enterprise Middleware, Identity and Access Management
Information Technology Services

UH Groupings



A grouping is a special type of group



Group Store



banner :
registration :
201610 :
enrolled



peoplesoft :
affiliation :
manoa :
faculty+staff

intersect



Your Groups

**Your grouping for Manoa faculty/staff
currently taking classes on any campus**

**BASIS
subgroup**

**INCLUDE
subgroup**

**EXCLUDE
subgroup**

sync to...

LISTSERV mailing list



Group Store

hawaii.edu : **store** :



Banner

sis : curriculum : MAN : 10 : ARTH : ART : UG: BA : 201610

sis : registration : 201610 : MAN : ART : 101: CRN123:

enrolled, waitlisted, withdrawn
instructor, secondary-instructors

sis : registration : 201610 : enrolled: MAN : ART : 101

sis : registration : 201610 : enrolled: MAN : ART

sis : registration : 201610 : enrolled: MAN

sis : registration : 2016**: enrolled



PeopleSoft, RCUH, Student Employment, UHIMS

hris : **eac** : 22833107

hris : **eac** : 2283*

hris : **aff** : **uhm** : faculty.communityCollege

rcuh : **aff** : **rcuh** : staff.noDetails

sece : **aff** : **hcc** : studentEmployee.workStudy

uhims : **aff** : **uhh** : faculty.emeritus



Regardless of source

any-dataOrigin : aff : uhm : faculty+staff

hris : aff : **any-org** : staff



hawaii.edu:store



sis, hris, rcuh... (all sources have an affiliation subfolder)



aff



uhh, uhm, uhwo, hawcc, hcc, kaulaicc...

- faculty
- faculty+staff
- faculty+staff+student
- faculty+staff+student+other
- faculty+student
- faculty.communityCollege
- faculty.countyAgent
- faculty.courseInstructor
- faculty.emeritus
- faculty.graduateAssistant
- faculty.law
- faculty.lecturer
- staff
- staff.apt
- staff.apt.casual
- staff.apt.overload
- staff.civilService
- staff.executive
- staff.executive.casual
- staff.noDetails
- staff.noDetails.casual
- staff.nonCompensated
- faculty.lecturer.casual
- faculty.lecturer.overload
- faculty.librarian
- faculty.medical
- faculty.noDetails
- faculty.noDetails.casual
- faculty.noDetails.overload
- faculty.researchAssistant
- faculty.researcher
- faculty.specialist
- faculty.teachingAssistant
- faculty.university
- casual
- casualFaculty
- casualStaff
- overload
- overloadFaculty
- overloadStaff
- other
- ohana
- retiree
- nonCreditStudent
- nonCreditStudent.noDetails
- preStudent
- preStudent.accepted
- preStudent.applicant
- preStudent.financialAid
- student
- student.graduate
- student.graduate.law
- student.graduate.medical
- student.graduate.noDetails
- student.other
- student.other.apprenticeship
- student.other.continuingEducation
- student.other.postBaccalaureate
- student.other.professional
- student.other.undeclared
- student.undergraduate
- student.undergraduate.noDetails
- studentEmployee
- studentEmployee.studentHire
- studentEmployee.workStudy

All store items in one folder

hawaii.edu : auto

hawaii.edu : custom

curriculum: ... ART:UG:ge-201130-lt-201610

curriculum: ... ART:UG:201530

All store items in one folder

hawaii.edu : auto

curriculum: ... ART:UG:ge-201130-lt-201610

curriculum: ... ART:UG:201530

hawaii.edu : custom

All store items in one folder

hawaii.edu : auto

curriculum: ... ART:UG:ge-201130-lt-201610

hawaii.edu : menu

curriculum: ... ART:UG:201530

hawaii.edu : custom

All store items in one folder

hawaii.edu : auto

hawaii.edu : menu

hawaii.edu : custom

curriculum: ... ART:UG:ge-201130-lt-201610
reg...:201530:MAN:ART:101:CRN123:enrolled

curriculum: ... ART:UG:201530
reg...:201530:enrolled:MAN:ART

- Belongs in automatic or menu?
- Search twice

Did you find everything you needed?

hawaii.edu : raw ← Internal-use, ignore

hawaii.edu : store ← Look here for everything

hawaii.edu : custom

- Need Group Store storefront!

Groups not hidden by default

Root: hawaii.edu: custom: test: some-group

Select privileges to assign to some-group

member optin optout view read update admin

Confirm entities for assignment Entity may see that this group exists

Showing 1-1 of 1 Items
Select privileges above, and entities below and submit the form

- EveryEntity (GrouperAll)

- + Won't display members (view vs read)
- + Group Store needs to list its groups
- + Crowdsourced additions to Group Store
- + Reduce redundant groups
- Revoke view / obfuscate name

Groups can auto-transition to next semester



Your Groups

non-cc-students

- hawaii.edu:store:sis:registration:201610:enrolled:HIL
- hawaii.edu:store:sis:registration:201610:enrolled:MAN
- hawaii.edu:store:sis:registration:201610:enrolled:WOA

◆ Term Transition Attribute:

```
/^hawaii\.edu:store:sis:registration:\d+:enrolled:...$/
```

5

jan-01 spring

aug-20 fall

/pattern2/ position mmm-dd semester...

Group 2.2 upgrade may reset some metadata

- **Audit logs**

- **Created by**

- + **Group creators kept**

- **Creation timestamp**

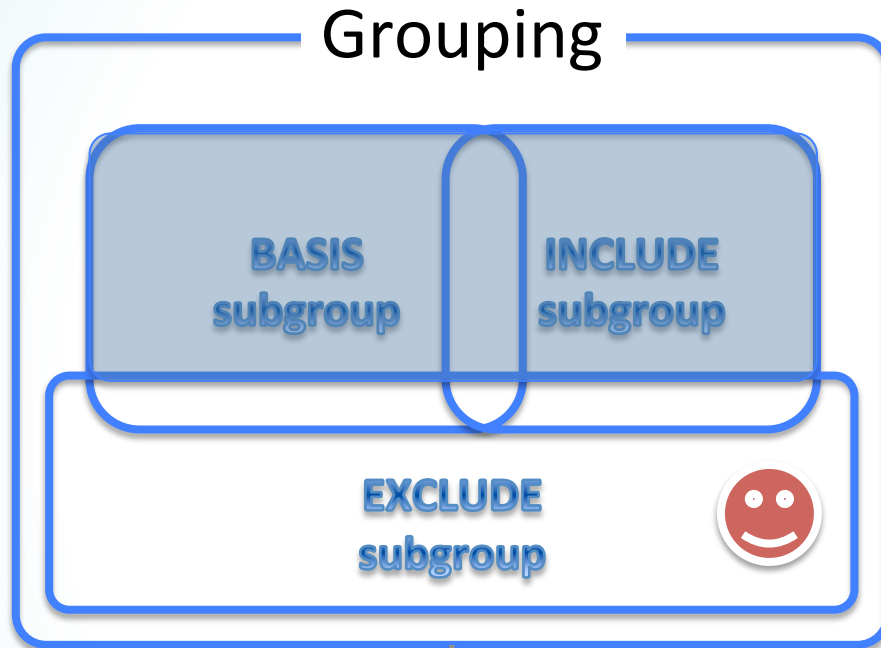
- + **No permissions are lost**

- **Modified by**

- **Modification timestamp**

- **Delete members pruned from LDAP**

LISTSERV sync issues



- Automatically exclude
- Notify grouping owner

LISTSERV
mailing-list



SIGNOFF mailing-list

Misc.

- **LDAP pruning affecting membership data**
 - + Do not prune if used by Grouper?
 - + Reconcile Banner & UHIMS policies?
- **Curriculum Groups**
 - + Fixed flawed model
 - + All programs auto-appear in group store
 - + Sliding window for terms

Questions?



Julio Polo

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Quick Topics

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Quick Topics

- ITS IAM Projects for FY2016
- New LDAP Attributes Under Consideration
- Phasing Out CAS Support for HTTP



IAM Projects for FY2016

- AuthN/Z Infrastructure Upgrades
 - Shibboleth Software Upgrades (Nov/Dec)
 - Shibboleth v3
 - Simplified Infrastructure increases availability
 - CAS to Shibboleth/CAS Transition (Mar)
 - Retire Legacy CAS Infrastructure (TBD)
 - Implement new F5 Application Load Balancer
 - Increases availability
 - Goodbye bifurcations



IAM Projects for FY2016

- MFA Project Update
 - Duo Security, our (hosted) solution of choice
 - Obtain a system-wide faculty/staff license (Dec)
 - Prepare the online support information (Jan)
 - Prepare ITS Help Desk for providing support (Jan)
 - Selection a pilot application for initial rollout (Feb)
 - Incorporate feedback and lessons learned
 - Expand, wash, rinse and repeat, expand



New LDAP Attributes

- New Attributes Drafted for Consideration
 - UH Email Address
 - Primary/Home Campus
 - Released Group Memberships
- IAM Data Element Dictionary
 - Includes current and draft attributes

<https://www.hawaii.edu/bwiki/display/UHIAM/IAM+Data+Element+Dictionary>



New LDAP Attributes

- UH Email Address
 - Tentative LDAP name: [uhEmail](#)
 - Example value: [janedoe@hawaii.edu](#)
 - Address issues developers are having with the current LDAP multi-value “mail” attribute.
 - The first occurrence of “mail” can yield
 - the anticipated UH email address, or
 - the first.last UH email address, or, on occasion,
 - a 3rd-party email address.



New LDAP Attributes

- Primary/Home Campus
 - Tentative LDAP name: [uhScopedHomeOrg](#)
 - Scoped by System of Record
 - A person can have more than one entry
 - Only one per org though
 - For employment purposes (PeopleSoft HR)
 - The primary campus handles the employee's paperwork
 - For academic purposes (Banner)
 - The home campus is set by the student's primary curriculum



New LDAP Attributes

- Released Group Memberships
 - Tentative LDAP name: [uhReleasedGroupings](#)
 - Relates to UH Groupings
 - Publication to LDAP, if set by the UH Groupings owner
 - More refinement needed before fully baked
 - Anticipating 100s/1000s entries per person at full scale
 - An important piece of externalizing AuthZ
 - Useful for determining permissions/entitlements
 - Accessible via CAS attributes



Phasing Out CAS Support for HTTP

- Why?
 - Increases confidence
 - Keeps traffic private
 - Google ranks the pages higher
- When?
 - *TBD*
- Grandfathering?
 - Yes, for a limited period *TBD*



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Wrapping Up



- Email suggestions for future topics to mhodes@hawaii.edu
- Take a moment to introduce yourself to your colleagues
 - Check out the snacks in the back
 - Meet at least 1 new person