# CAS

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# CAS (Central Authentication Service)

## Introduction

> The CAS protocol is a simple and powerful ticket-based protocol. It involves one or many clients and one server. Clients are embedded in CASified applications (called “CAS services”) whereas the CAS server is a standalone component.

The Cas protocol makes it possible to implement the SSO authentication method that allows users to access web applications with a single sign-on.

The specification versions recognized are 3.0.3 and 2.0



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*https://apereo.github.io/cas/6.5.x/protocol/CAS-Protocol.html*

# CAS architecture

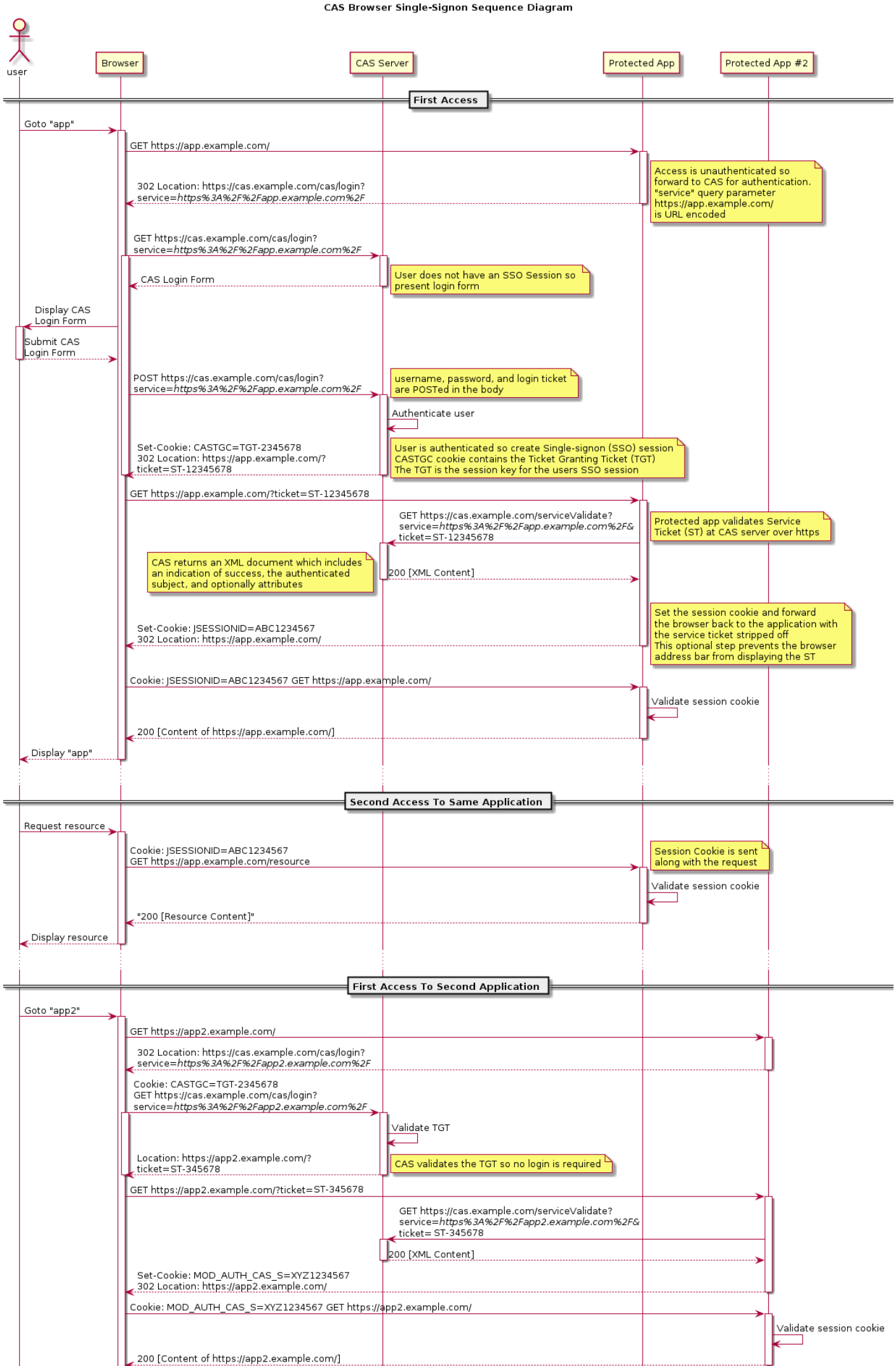
## Introduction

The CAS is a Single Sign On protocol for the web. This protocol allows users to access multiple applications by providing their credentials.

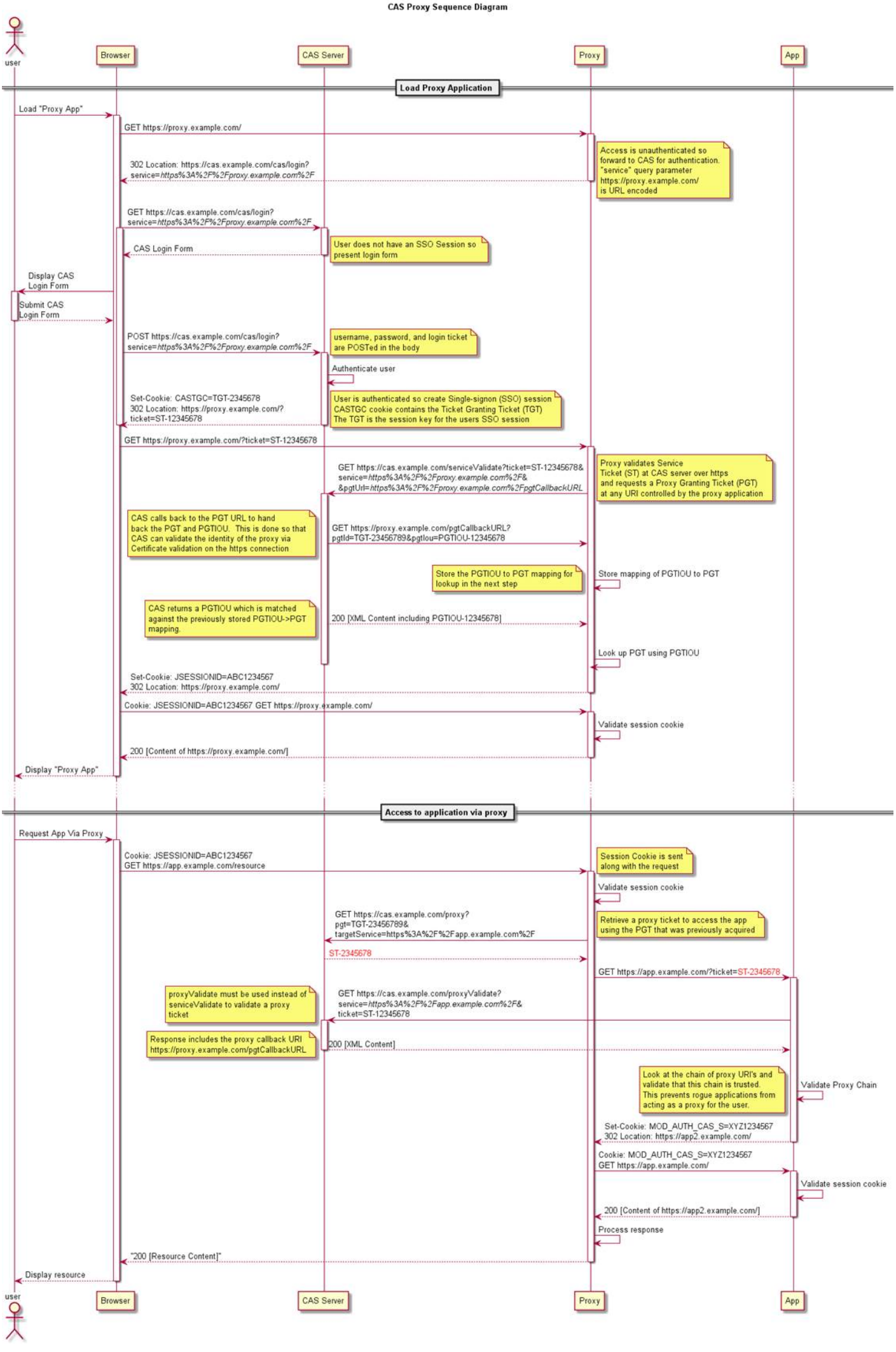
The response will be a JSON or XML

## Single Log-in

The single log-in is usually initiated by the application server. The typical UML use case is as follows:


CAS Browser Single-Signon Sequence Diagram
user
Browser
CAS Server
Protected App
Protected App #2
First Access
Goto "app"
GET https://app.example.com/
Access is unauthenticated so forward to CAS for authentication. "service" query parameter https://app.example.com/ is URL encoded
302 Location: https://cas.example.com/cas/login? service=https%3A%2F%2Fapp.example.com%2F
GET https://cas.example.com/cas/login? service=https%3A%2F%2Fapp.example.com%2F
User does not have an SSO Session so present login form
CAS Login Form
Display CAS Login Form
Submit CAS Login Form
POST https://cas.example.com/cas/login? service=https%3A%2F%2Fapp.example.com%2F
username, password, and login ticket are POSTed in the body
Authenticate user
Set-Cookie: CASTGC=TGT-2345678
302 Location: https://app.example.com/? ticket=ST-12345678
User is authenticated so create Single-signon (SSO) session
CASTGC cookie contains the Ticket Granting Ticket (TGT)
The TGT is the session key for the users SSO session
GET https://app.example.com/?ticket=ST-12345678
GET https://cas.example.com/serviceValidate? service=https%3A%2F%2Fapp.example.com%2F& ticket=ST-12345678
Protected app validates Service Ticket (ST) at CAS server over https
CAS returns an XML document which includes an indication of success, the authenticated subject, and optionally attributes
200 [XML Content]
Set the session cookie and forward the browser back to the application with the service ticket stripped off
This optional step prevents the browser address bar from displaying the ST
Set-Cookie: JSESSIONID=ABC1234567
302 Location: https://app.example.com/
Cookie: JSESSIONID=ABC1234567 GET https://app.example.com/
Validate session cookie
200 [Content of https://app.example.com/]
Display "app"
Second Access To Same Application
Request resource
Cookie: JSESSIONID=ABC1234567
GET https://app.example.com/resource
Session Cookie is sent along with the request
Validate session cookie
"200 [Resource Content]"
Display resource
First Access To Second Application
Goto "app2"
GET https://app2.example.com/
302 Location: https://cas.example.com/cas/login? service=https%3A%2F%2Fapp2.example.com%2F
Cookie: CASTGC=TGT-2345678
GET https://cas.example.com/cas/login? service=https%3A%2F%2Fapp2.example.com%2F
Validate TGT
Location: https://app2.example.com/? ticket=ST-345678
CAS validates the TGT so no login is required
GET https://app2.example.com/?ticket=ST-345678
GET https://cas.example.com/serviceValidate? service=https%3A%2F%2Fapp2.example.com%2F& ticket= ST-345678
200 [XML Content]
Set-Cookie: MOD_AUTH_CAS_S=XYZ1234567
302 Location: https://app2.example.com/
Cookie: MOD_AUTH_CAS_S=XYZ1234567 GET https://app2.example.com/
Validate session cookie
200 [Content of https://app2.example.com/]

# Proxy web flow diagram


CAS Proxy Sequence Diagram
user
Browser
CAS Server
Proxy
App
Load Proxy Application
Load "Proxy App"
GET https://proxy.example.com/
Access is unauthenticated so forward to CAS for authentication. "service" query parameter https://proxy.example.com/ is URL encoded
302 Location: https://cas.example.com/cas/login?service=https%3A%2F%2Fproxy.example.com%2F
GET https://cas.example.com/cas/login?service=https%3A%2F%2Fproxy.example.com%2F
User does not have an SSO Session so present login form
CAS Login Form
Display CAS Login Form
Submit CAS Login Form
POST https://cas.example.com/cas/login?service=https%3A%2F%2Fproxy.example.com%2F
username, password, and login ticket are POSTed in the body
Authenticate user
Set-Cookie: CASTGC=TGT-2345678
302 Location: https://proxy.example.com/?ticket=ST-12345678
User is authenticated so create Single-signon (SSO) session CASTGC cookie contains the Ticket Granting Ticket (TGT) The TGT is the session key for the users SSO session
GET https://proxy.example.com/?ticket=ST-12345678
GET https://cas.example.com/serviceValidate?ticket=ST-12345678&service=https%3A%2F%2Fproxy.example.com%2F&&pgtUrl=https%3A%2F%2Fproxy.example.com%2FpgtCallbackURL
Proxy validates Service Ticket (ST) at CAS server over https and requests a Proxy Granting Ticket (PGT) at any URI controlled by the proxy application
CAS calls back to the PGT URL to hand back the PGT and PGTIOU. This is done so that CAS can validate the identity of the proxy via Certificate validation on the https connection
GET https://proxy.example.com/pgtCallbackURL?pgtId=TGT-23456789&pgtIou=PGTIOU-12345678
Store the PGTIOU to PGT mapping for lookup in the next step
Store mapping of PGTIOU to PGT
CAS returns a PGTIOU which is matched against the previously stored PGTIOU->PGT mapping.
200 [XML Content including PGTIOU-12345678]
Look up PGT using PGTIOU
Set-Cookie: JSESSIONID=ABC1234567
302 Location: https://proxy.example.com/
Cookie: JSESSIONID=ABC1234567 GET https://proxy.example.com/
Validate session cookie
200 [Content of https://proxy.example.com/]
Display "Proxy App"
Access to application via proxy
Request App Via Proxy
Cookie: JSESSIONID=ABC1234567
GET https://app.example.com/resource
Session Cookie is sent along with the request
Validate session cookie
GET https://cas.example.com/proxy?pgt=TGT-23456789&targetService=https%3A%2F%2Fapp.example.com%2F
Retrieve a proxy ticket to access the app using the PGT that was previously acquired
ST-2345678
GET https://app.example.com/?ticket=ST-2345678
proxyValidate must be used instead of serviceValidate to validate a proxy ticket
GET https://cas.example.com/proxyValidate?service=https%3A%2F%2Fapp.example.com%2F&ticket=ST-12345678
Response includes the proxy callback URI https://proxy.example.com/pgtCallbackURL
200 [XML Content]
Look at the chain of proxy URI's and validate that this chain is trusted. This prevents rogue applications from acting as a proxy for the user.
Validate Proxy Chain
Set-Cookie: MOD_AUTH_CAS_S=XYZ1234567
302 Location: https://app2.example.com/
Cookie: MOD_AUTH_CAS_S=XYZ1234567
GET https://app.example.com/
Validate session cookie
200 [Content of https://app2.example.com/]
Process response
"200 [Resource Content]"
Display resource

*https://en.wikipedia.org/wiki/Central_Authentication_Service*

# CAS Example

## Service Provider

