ACME Auto Discovery

draft-vanbrouwershaven-acme-auto-discovery

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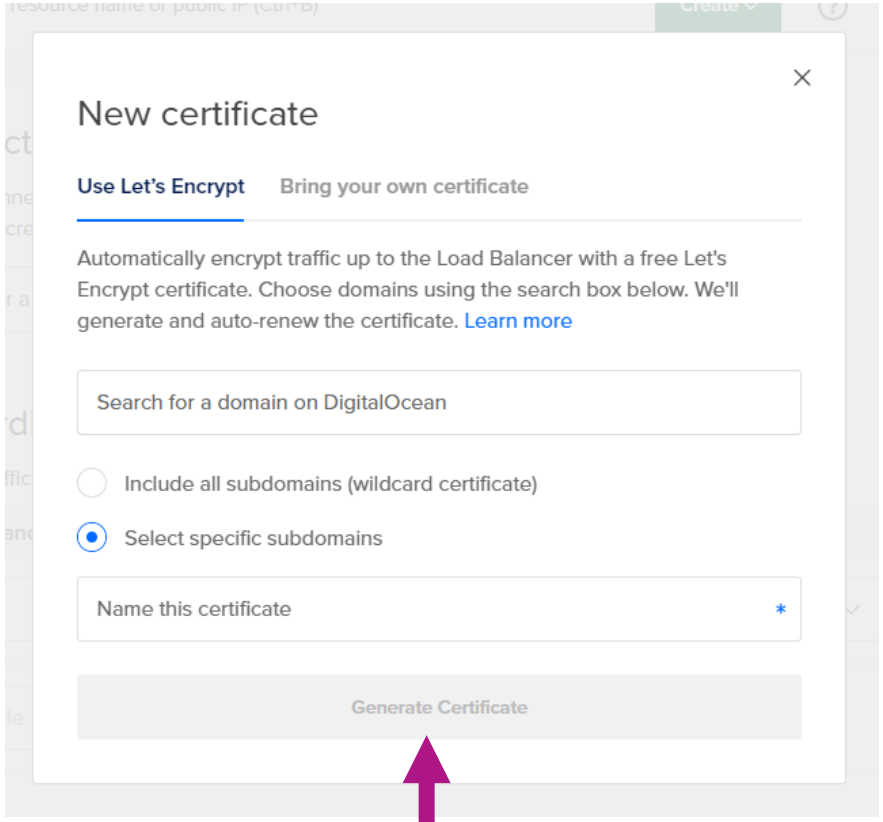
ACME WG

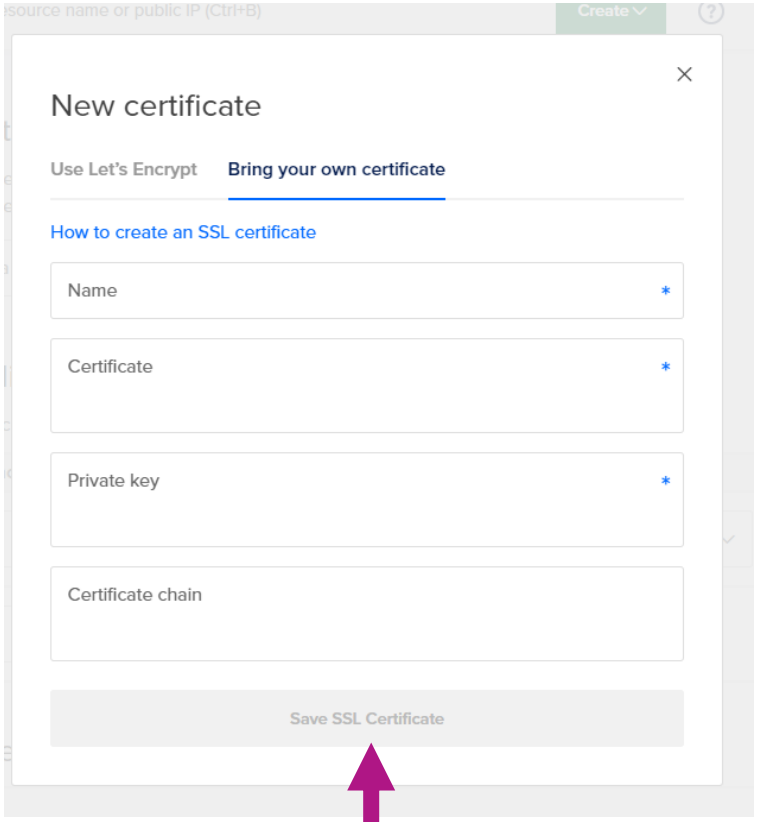
IETF 118 – Prague | November 2023

Problem refresher from 117

DIGITALOCEAN - LOAD BALANCER



You can use Let's Encrypt (ACME), provide some configuration, but you **can not** specify your own ACME server or account binding.



Or you can upload a custom certificate.

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PROBLEM

- A certificate with a validity of 90-days ‘requires’ automation
  - Renewing a certificate manually 4-6 times will not be ‘appreciated’
- When subscribers can’t specify their preferred ACME server, the **default** will become the norm!
- If the default is the norm, we **lack issuer diversity** which risks becoming a single point of failure.
- (side-benefit: prioritized list of fallback ACME servers for a given domain)

How do we automate discovery of the domain owner’s preferred CA?

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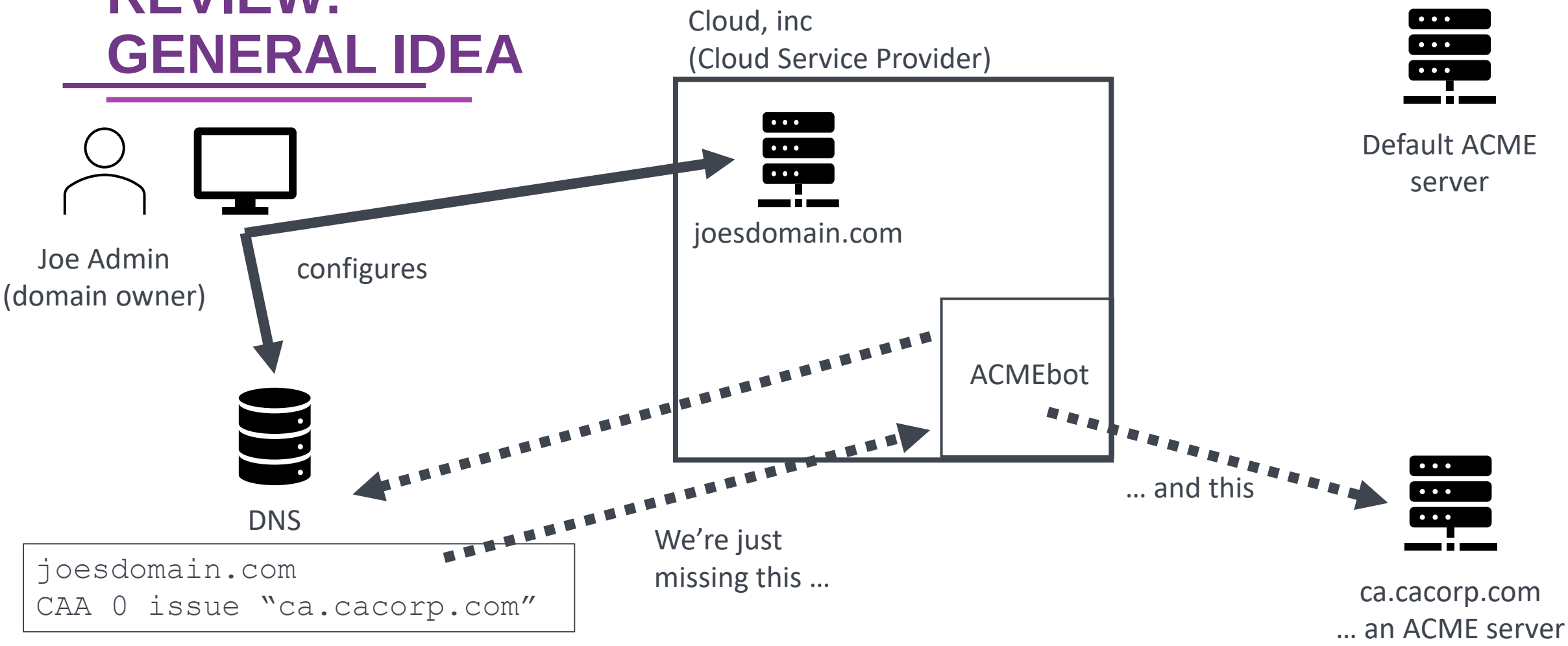
REVIEW: GENERAL IDEA



… you would think there's enough info here
to send ACMEbot to the Joe's preferred ACME server …

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Current Status

Status

- A new draft (-02) was released incorporating the feedback received.
- We have identified (and are attempting to solve) more challenges around the external/internal account binding mechanisms.
  - General problem: How to associate incoming ACME requests with the correct CA account?
  - Sub-Problem 1: The ACME account will be owned by the CSP and may either be re-used across all customers they manage, or may be a fresh account per ACME request.
    - So we cannot use ACME account to retrieve the appropriate CA account.
  - Sub-Problem 2: multiple CA accounts are authorized to issue for the same domain.
    - So we cannot use requested domain to retrieve the appropriate CA account.

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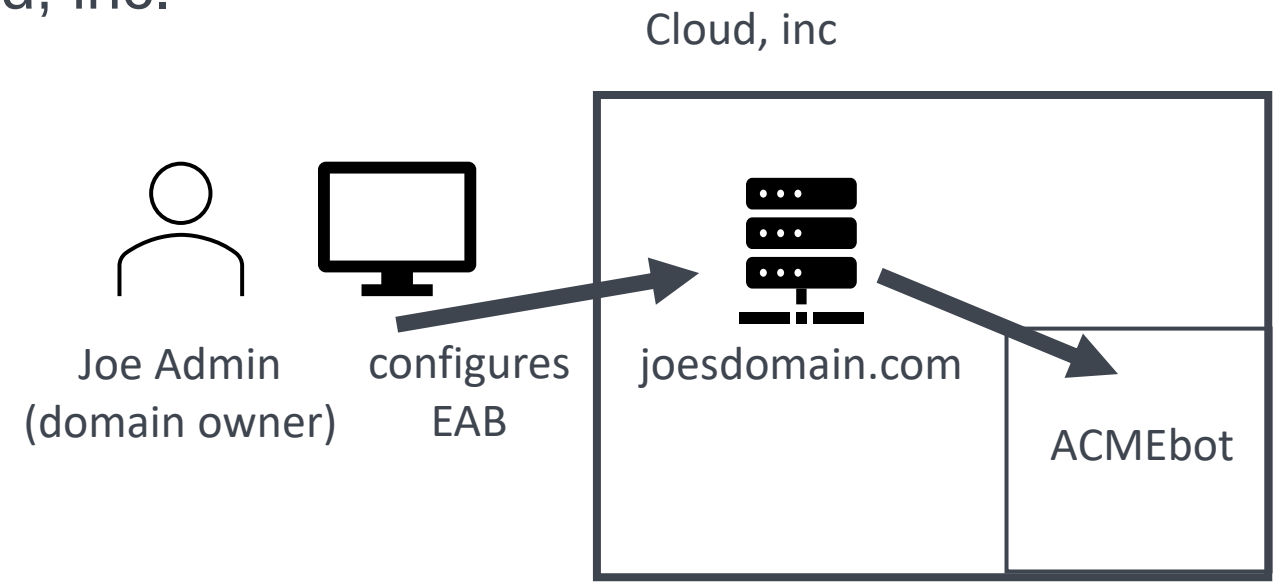
Problem 0: External Account Binding keys

- ACME already has External Account Binding keys, but they can't be leveraged here because:
  1. Passing Joe's EAB key down to ACMEBot requires UI changes in Cloud, inc.
  2. Joe's EAB key may have more permissions than Joe really wants to share with Cloud, inc.



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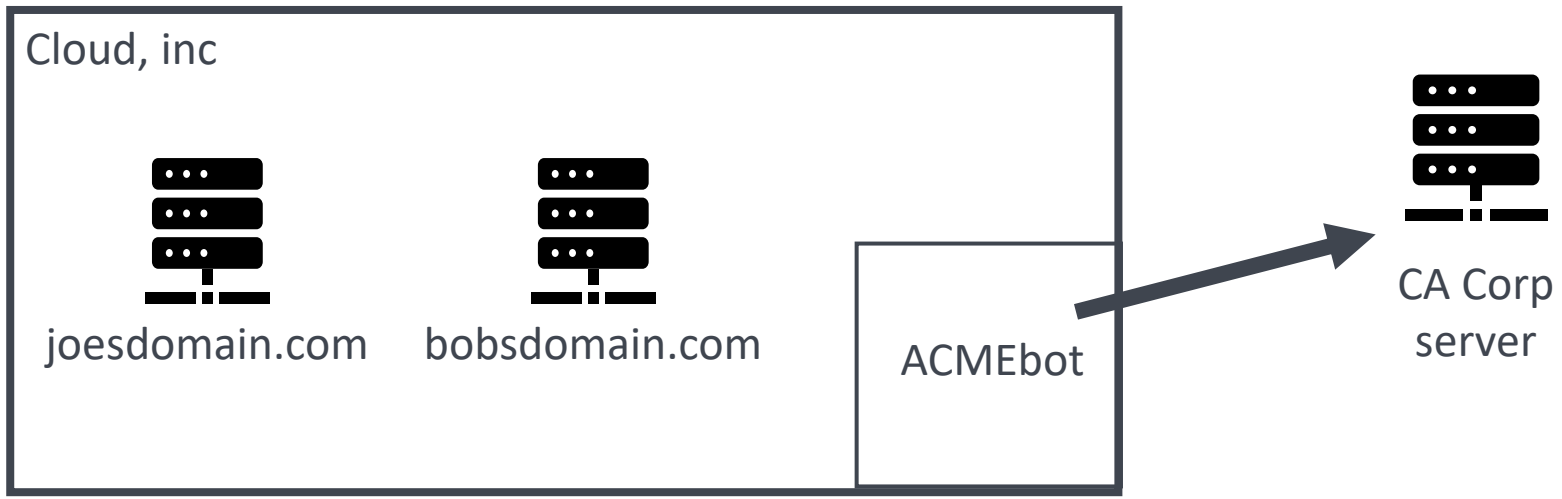
Problem 1: ACME accounts are not unique per CA account

- Most service providers currently work by either having a single ACME account per CA, or generating throwaway ACME accounts – ex.: Certbot automatically creates a new account for each ACME server but doesn't know anything about users, actually, Cerbot creates the account keys in a shared config folder by default.
- This problem is described in section 9.3 of the security considerations of the draft.



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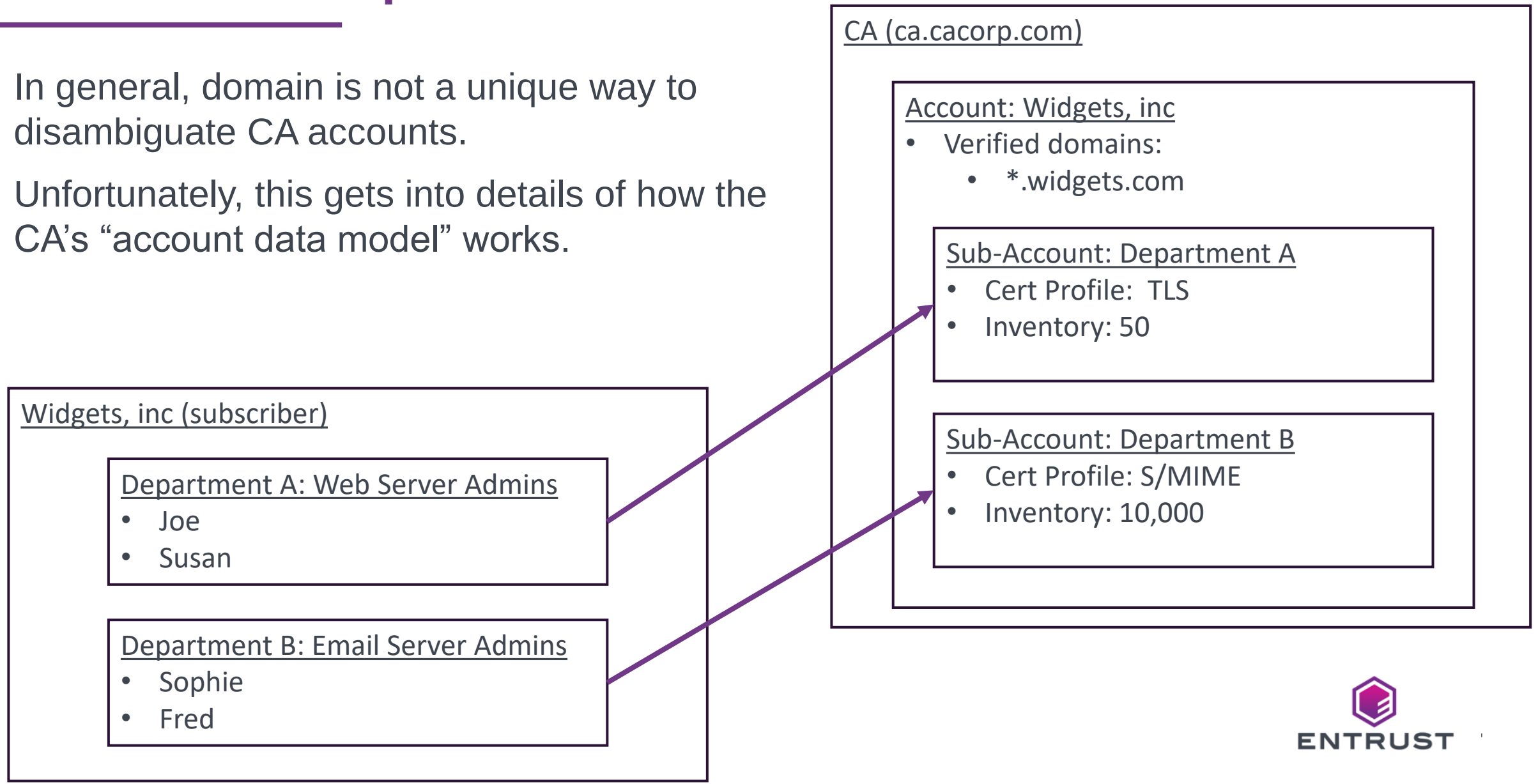
Problem 2: Multiple CA accounts for the same domain

- In general, domain is not a unique way to disambiguate CA accounts.
- Unfortunately, this gets into details of how the CA's "account data model" works.



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Potential Account Binding (AB) Mechanisms

External AB

- Not supported by Cloud Service Providers (CSP).
- Unlikely to gain support as it requires interface and implementation changes by the CSP.
- Requires a unique account per CSP customer.

Internal AB (email)

- Described in section 7.1.2 of the draft.
- Prone to phishing attacks.
- Easier to implement than the EAB as required information (email) is already known by the CSP.
- Requires a unique account per CSP customer.

Internal AB (DV)

- Described in section 7.1.1 of the draft.
- Does not require any CSP changes.
- Requires a unique account.

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Int… AB (DV)

…n 7.1.1

Design is still ongoing, we're not sure this is right yet.

More vendor input is needed here!

For example, is email really the right mechanism? What about a UUID in the CAA DNS record to disambiguate accounts? Or maybe {domain + cert profile} is unique? More design needed.

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Shared Account Binding

- Not described in the draft, looking for feedback
- Similar to where the CSP (Cloud Service Provider) is a reseller of the CA and uses one set of API credentials for multiple customers, except there would be no contract between the CA and the CSP
- The ACME key could identify the CSP, to allow CA customers to enable specific CSP
  - The CSP could publish its public key(s) in its well-known directory
  - The CSP could obtain a certificate for it's ACME key and include it in the x5u parameter of the JWK
    - less likely to see broad adoption, involves validation costs and renewal procedures
  - A challenge response with the account key email address could be performed (based on the CSP domain, e.g., @aws.com)
    - less likely to see broad adoption, requires (automated) acknowledgement on the CSP side
- Domain Control Validation determines if the CSP is authorized to issue this certificate

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Summary & Next Steps

- This draft **slowed down** when we realized there's a hard problem buried in here.
- We need more design iteration on how to disambiguate which CA account a given ACME request should be associated with – we may need to consider authentication and authorization separately.

- This may need **a design group** of CAs and CSPs to make sure we've captured and addressed the sticky cases properly (some of which may be CA-specific).

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Thank You

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SECURING A WORLD IN MOTION