Enabling Cloud-Native Applications with Application Credentials in Keystone

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Overview

- Why we needed application credentials
- What are application credentials? (with demo!)
- The future of application credentials

Before...

Cloud applications

```
from cinderclient import client
from keystoneauth1 import session
from keystoneauth1.identity.generic import password
auth = password.Password(username='cmurphy',
                         password='secrets',
                         project_name='production',
                         user_domain_name='LDAP_EMEA',
                         project_domain_name='Default',
                         auth_url='https://cloud.example.com/identity')
s = session.Session(auth=auth)
cinder = client.Client('3', session=s)
cinder.volume_backups.create('5ee22c66-4ce7-4136-bffa-371a4cf40d43')
```

~~Principle of Least Privilege~~

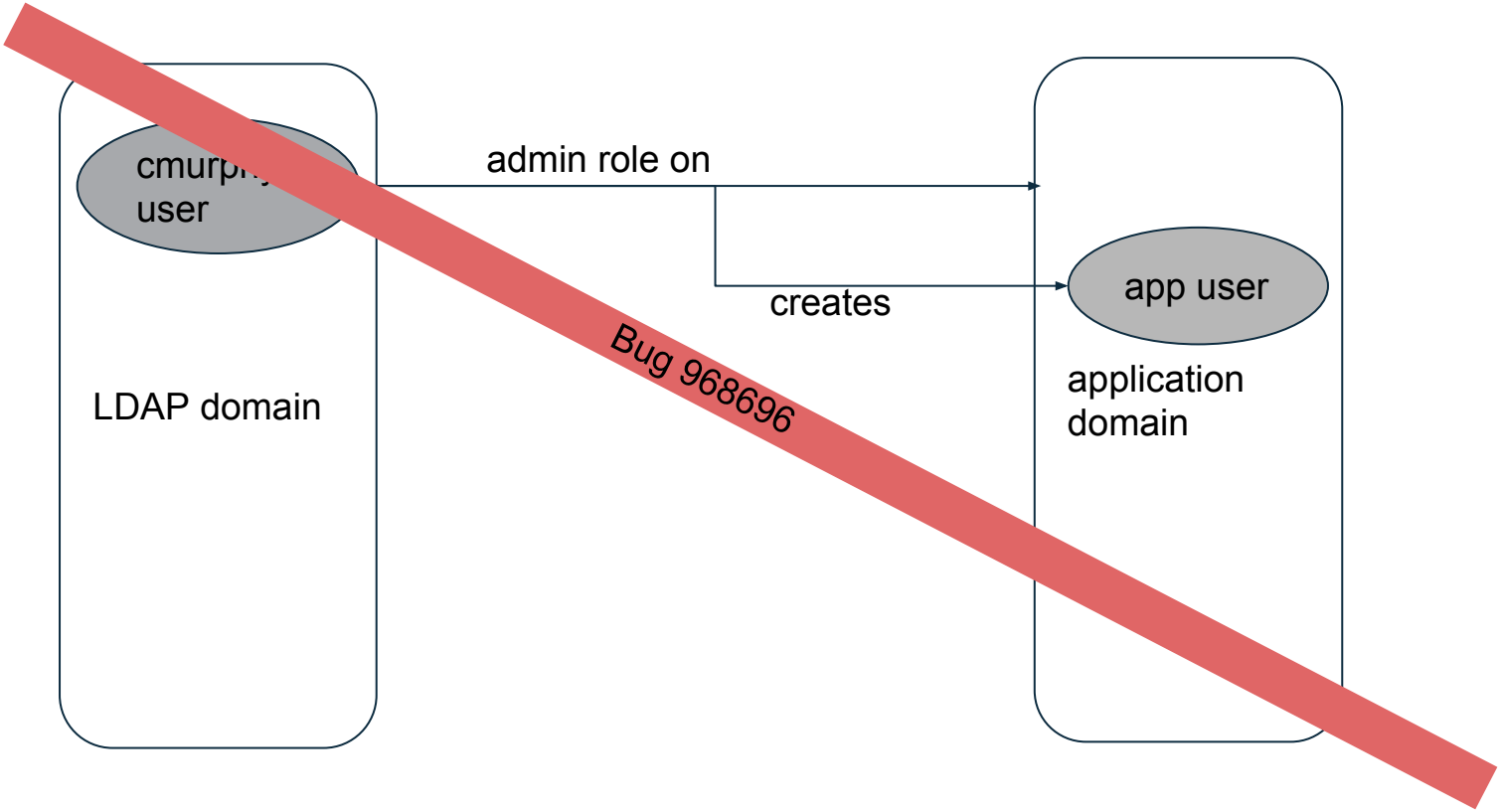
- Applications have access to everything the user has access to

Passwords in config files

- openrc files
- clouds.yaml
- {nova,cinder,neutron,...}.conf
- yourapplication.ini

Protecting plaintext secrets: https://review.openstack.org/474304

LDAP passwords in config files



Password rotation == downtime

Steps to change a keystone user's compromised password:

1. `openstack user set --password moresecurepassword appuser`
2. [applications are suddenly down, being unable to authenticate]
3. Update config files on all worker nodes
4. Restart services on all worker nodes
5. [applications can auth again]

Introducing Application Credentials

Application Credentials

An application credential is a **scoped** auth method that a user creates to delegate a subset of their role assignments on a single project to something else - whoever or whatever possesses knowledge of the identifier and the secret belonging to the application credential.

- Has its own secret
- Can only access one project, no matter how many projects the user is in
- Can have all or a subset of the roles the user has on that project
- Is **user-lived** - when the user is deleted, the app credential dies
- User can have many

What's in a name?

Why are they called application credentials? What's wrong with API keys?

- "Application credentials" is a name we invented without any industry-known connotations

Why not trusts?

- Not fully self-service
- Still requires your keystone user's password to auth

Live demo

Authenticating

```
clouds:
openstack:
  auth:
    auth_url: https://cloud.example.com/identity/v3
    application_credential_id: "a2911c0aadea457e8d713955ab3675d0"
    application_credential_secret: "BB6L1wghFcr5AlZ3JK6vEl-B936vACEJJoof"
  region_name: "RegionOne"
  interface: "public"
  identity_api_version: 3
  auth_type: "v3applicationcredential"
```

Authenticating

```
clouds:
openstack:
  auth:
    auth_url: https://cloud.example.com/identity/v3
    username: "cmurphy"
    user_domain_name: "suse.de"
    application_credential_name: "volume_backups_001"
    application_credential_secret: "BB6L1wghFcr5AlZ3JK6vEl-B936vACEJJoof"
  region_name: "RegionOne"
  interface: "public"
  identity_api_version: 3
  auth_type: "v3applicationcredential"
```

Rotation

1. `openstack application credential create volume_backups_cred_002`
2. [applications are still using old app cred]
3. Update config files on all worker nodes
4. Restart services on all worker nodes [applications start using the new app cred]
5. `openstack application credential delete volume_backups_cred_001`

What about project-lived credentials?

The need:

- Team member writes an application for a keystone project
- Creates application credential for the project, shared with the team
- Team member is reassigned
- Application keeps working

What about project-lived credentials?

The problem:

- Employee privately creates application credential for a keystone project, records secret
- Employee's keystone user is deleted
- Employee can still access that project using the application credential identifier and secret

Handling team attrition

If the team member that created the application credential is leaving:

Plan ahead. Rotate the application credential before their user is decommissioned in order to avoid downtime.

If someone else on the team is leaving:

Plan ahead! For security, the application credential should still be rotated, even though the user leaving won't cause downtime.

Keystone can't solve people problems.

The Future

Fine-grained access control

Currently:

```
openstack application credential create myappcred \
  --role member
```

Soon:

```
openstack application credential create myappcred \
  --capabilities \
  '[{"service": "volume", "path": "/v3/{project_id}/backups",
"type": "POST"}]'
```

Rotation automation

Automating around user-lived application credentials

System scope

Allow cloud administrators to automate system-level tasks

Thanks! Questions?

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