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Multiple SSH key holding on CloudStack

About me

I am a pre-final year student, pursuing a Dual Degree (Bachelor of Technology+Master of Technology) course at IIT BHU, India. I have gained interest in programming and algorithms in college, and looking for a career in this field. I have previously worked on Machine Learning and NLP. I have worked on hate speech detection in tweets, have worked on Text summarization using Deep learning , also worked on image detection, and image generation using advanced machine learning models.

I was aware of the Cloud technology previously, and I found this Organisation and this project interesting as it will be a great opportunity to learn this technology and be part of the open-source project.

Background

CloudStack provides SSH authentication to their users and establishes a secure connection between remote computers and the server. SSH uses the functionalities of private key and public key. In a user key set, the private key remains on the system being used to access the remote system (i.e. the user's desktop or laptop) and is used to decrypt information that is exchanged in the SSH protocol. Private keys should never be shared with anyone and should be secured on a system.

The SSH key can be updated or changed by users when they need. But ACS holds only one SSH key for one user at a time. Thus if there is a group of people working on a single project they use the same key. And when any update is needed all the users are to be aware also if anyone is removed from the team, the SSH key then needs a change too. This process becomes too cumbersome when there are several VMs.

Description of work

In Google Summer of Code-2021, I am expecting to work in this project where ACS would be able to hold multiple SSH keys. This will allow the users then to change/reset them according to their needs. There will be a list of keys and the list can be updated when a team member is added or removed, and this will not create any disruption to other users.

Benefits for Apache community

After the work is complete ACS would be able to use multiple SSH keys, thus benefiting the users and freeing them of the cumbersome process of changing and managing the keys every time a user is added/removed. The work is certainly doable in the given timeframe and the GSoC period will be fun learning new technologies, experience working in the open-source community.

The update with the ACS made will greatly help the user community. Multiple SSH key support features will let the users or a group of users in a project efficiently handle the users and their access to the VMs. Users will get rid of the cumbersome process of managing the keys in large projects with help of this multiple keys.

It would benefit the users by allowing them to add their own personal SSH key to a VM and avoid the hassle of managing multiple shared keys for different VMs (across projects / domains). It also solves the problem when a user is removed as their key can be removed from the list, revoking their access without the need for a new key to be regenerated and shared. It could also simplify monitoring as well as automation from a central server to the VMs in the infrastructure without additional steps of using a specific key per VM or group of VMs.

Deliverables

We will make the following changes during GSoC-21:

- We will modify the CloudStack API so that it can hold multiple SSH keys.
- Make changes in the service layer which holds the request.
- Make changes in the database
- Update the UI accordingly.

Timeline

Community Bonding Period (May 4th - June 1st)

- Set up the development environment.
- Interact with mentors, introduce myself to the community, and actively get involved in the discussion.

- Get familiar with ACS. Understand expected coding, documentation, and testing standards.
- Set up the wiki page to keep track of weekly progress.
- Develop a better understanding of ACS, SSH keys, the ACS UI, ACS database.

Time Period	Proposed Work
Week 1 (June 7 - June 14)	• Understand ACS. • Get familiar with how to build and run CloudStack.
Week 2 (June 14- June 21)	• Learn the VM deployment stage, how ssh key is used • Understand the relevant underlying functionalities of VM template.
Week 3 (June 21 - June 28)	• Setup a KVM based environment instead of simulator now. • Deploy an actual VM with ssh key. • Learn the codebase where ssh is passed.
Week 4 (June 28- July 5)	• Start looking for ways to support multiple keys • Look in the API, service layer what changes need to make.
Week 5 (July 5- July 12)	• Test all the previous works. • Fix any problem that arises. Make the plan for the next period. • Create the first term report.

First Evaluation Period (July 12 - July 16)

- Submit the works done till date.
- Evaluation made.

Time Period	Proposed Work
Week 6 (July 12 - July 19)	• Look for the changes that need to be done in API. • Make the changes.
Week 7 (July 19 - July 26)	• Look for the changes needed in databases. • Make the changes.

Week 8 (July 26 - Aug 2)	• Look for changes in ACS UI, make changes • Do mavin based functional test, which will test multiple ssh holding.
Week 9 (Aug 2 - Aug 9)	• Check if any error is present. • Solve errors that are found.
Week 10 (Aug 9 - Aug 16)	• Make the final report.

Final Evaluation Period (August 16 - August 30)

- Aug 16-Aug 23: Submit a detailed final report with all the changes made.
- Aug 23-Aug 30: Mentors submit final student evaluations.

Other commitments

I do not have any large time conflicts during the GSoC period.

However, my college may reopen sometime in July if the COVID situation gets better, so I'll have to devote around 3-4 hours a day to the classes, and the rest of the time can be given to my GSoC work. I can assure that it won't affect my performance much, because my college course next semester is not very hectic.