Managed Identities/Service Principals (version 1.0)

**Cloud Service Label: IaaS, PaaS**

Description

Both Azure and AWS employ authentication/authorization accounts that enable user access paradigms to be applied to cloud applications and resources. In Azure these “service principals” are called Managed Identities and can be assigned to VM’s and other Azure resources rather than embedding access credentials elsewhere within the resource that could be stolen. These service principals can be leveraged by any one with local command privileges to access cloud resources that the service principal object may have rights to.

In Azure, Automation accounts are required to automate admin tasks and are automatically assigned contributor privileges to the subscription. Contributor access on the subscription inherently gives you contributor rights on all of the virtual machines in a subscription which in turn grants you SYSTEM on Windows and root on Linux VMs.

Examples

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| **Name** | **Tactic** | **Description** |
| NetSPI | Defense Evasion | Users allowed to create work books inside an Azure automation account can run code with the permissions of the automation account which often has contributor rights to the subscription. |
| NetSPI | Escalation | NetSPI proof of concept that allows any user with access to Azure VM to retrieve and use tokens from an assigned Service Principal to escalate privileges. |
| NetSPI | Persistence | NetSPI proof of concept using automation account credentials to maintain persistence on running VM’s (even if initial credentials are replaced/revoked?) |

Mitigations

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| **Mitigation** | | **Description** |
| Least Privilege | | All access given to users in the cloud environment should be assigned by the necessary privileges needed for team members to complete their job responsibilities. Ensure that temporary access tokens are issued rather than permanent credentials, especially when access is being granted to entities outside of the internal security boundary. |
|  | AWS | To implement least privilege in an AWS environment IAM policies will be used. This gives the ability to allow users to perform list, read, write, permissions management, or tagging actions. AWS suggests utilizing *last accessed information* and A*WS CloudTrail event history* to get a better understanding of privileges that might be needed or reduced based on a specific role. Full details can be found at **https://docs.aws.amazon.com/IAM/latest/UserGuide/best-practices.html#grant-least-privilege.** |
|  | Azure | To implement least privilege in an Azure environment Azure Active Directory roles will be used. Azure outlines different tasks and the least privileged role that are suggested to be associated with the task. Those details can be found at: **https://docs.microsoft.com/en-us/azure/active-directory/users-groups-roles/roles-delegate-by-task.** To learn how to assign specific roles it can be done via the Azure Active Directory Portal. Instructions on how to assign roles can be found here: **https://docs.microsoft.com/en-us/azure/active-directory/users-groups-roles/directory-manage-roles-portal.** |
|  | GCP | To implement least privilege in GCP it is recommended to use predefined roles (which allow for granular access permissions) instead of primitive roles (roles/owner, roles/editor, and roles/viewer). Full details on the difference between types of roles can be found here: **https://cloud.google.com/iam/docs/understanding-roles.** To assign these roles IAM service accounts are used and complete details can be found at: **https://cloud.google.com/iam/docs/using-iam-securely#least\_privilege.** |

Detection

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| **Detection** | **Description** |
| Create Log Metric Filters and Alarms for AWS | To create a metric filter and alarm:   1. Create a metric filter that checks for IAM policy changes and the *<cloudtrail\_log\_group\_name>* 2. Create an SNS topic 3. Create an SNS subscription to the above topic 4. Create an alarm associated with the filter and SNS topic created in steps 1 and 2 respectively |
| Monitor Activity in AWS Account | Various services in AWS offer logging features that allow for detection capabilities. These include CloudFront, CloudTrail, CloudWatch, Config, and S3. |
| Monitor for Suspicious Activity in Azure | Azure AD can generate anomaly reports than can be run on a daily basis. Azure AD Identity Protection show current risks in its dashboard and provides daily email summary notifications. Policies can also be configured to alert to specific issues. |
| Create Log Metric Filters and Alarms for CloudTrail | To create a metric filter and alarm:   1. Create a filter that checks for CloudTrail changes and the specific *<cloudtrail\_log\_group\_name>* 2. Create an SNS topic that the alarm will notify 3. Create an SNS subscription to the above topic 4. Create an alarm associated with the filter from step 1 and SNS topic in step 2 |
| Create Activity Log Alerts in Azure | To create log activity alerts for deletion in the Azure Console:   1. Navigate to *Monitor’ / ‘Alerts* 2. Select *Manage alert rules* 3. Click on the Alert *Name* where Condition contains *operationName equals Microsoft.Network/networkSecurityGroups/securityRules/delete* 4. Hover a mouse over *Condition* to ensure it is set to *Whenever the Administrative Activity Log “Delete Security Rule (networkSecurityGroups/securityRules)” has “any” level with “any” status and event is initiated by “any*” |
| Create, View, and Manage Activity Alerts in Azure Monitor | To create a log alert in the Azure portal:   1. Select **Monitor -> Alerts** 2. Select **New alert rule** of the **Alerts** window 3. Provide information in **Define alert condition** 4. Provide details in **Define alert details** 5. Specify action group for new alert rule under **Action group**, or create a new action group with + **New group** 6. Select **Yes** for the **Enable rule upon creation** option 7. Select **Create alert rule**   To view and manage alerts:   1. Select **Monitor -> Alerts -> Manage alert rules** 2. Select the rule you want to modify and double-click to edit the rule options 3. Click **Save** |
| Azure Resource Manager Templates | Azure Resource Manager templates in the format of JSON files that can be used to configure metric alerts in Azure Monitor. These templates can be used for simple static and dynamic threshold metric alerts, availability tests, and monitoring multiple resources. |
| Enable CloudTrail across all regions in AWS | To enable CloudTrail across all regions:   1. Sign into the AWS Management Console and open the CloudTrail console 2. Click on *Trails* 3. Set necessary Trails to All option in the I column 4. Click on a trail via the link *Name* column 5. Set *Logging* to *ON* 6. Set *Apply trail to all regions* to *Yes* |
| Configure log profile to capture activity logs for all regions in Azure | To set up activity logs for all regions:   1. Navigate to Azure console 2. Go to *Activity log* 3. Select *Export* 4. Select *Subscription* 5. Check *Select all* in *Regions* 6. Select *Save* |

References

1. <https://blog.netspi.com/azure-privilege-escalation-using-managed-identities/>. Accessed June 1, 2020