User Guide: fn_aws_iam_v1.0.0

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Key Features

Amazon Web Services Identity and Access Management (AWS IAM) allows management of access to AWS services and resources securely. You can use IAM to create and manage AWS users and groups, and use permissions to allow or deny access to AWS resources. The AWS IAM integration with the Resilient platform allows you to query and update users or access keys for an AWS account.

You can execute the following types of queries:

- Get a list of users and associated items (login profile, access keys, groups, policies).
- Get a list of access keys.
- List objects associated with a user:
    - Access keys.

    - Groups.
    - Policies.
    - SSH public keys.
    - Service-specific credentials.
    - Signing certificates.
    - Active mfa devices (Virtual devices flagged).

You can also use the integration to make the following changes to an AWS IAM environment:

- Delete a user and delete or remove items associated with the user.
- Attach a user policy.
- Detach all policies for a user.
- Add a user to a group.
- Remove a user from all groups.
- Change a user profile password.
- Delete an access key.
- Delete all access keys for a user.
- Delete the login profile for a user.
- Delete all ssh Public Keys for a user.
- Delete all service-specific credentials for a user.
- Delete all signing certificates for a user.
- De-activate all active mfa devices for a user.
- Delete all active mfa virtual devices for a user.

Function - AWS IAM: List Users

The function can perform a get of IAM user or users in the AWS account. Users can be filtered by user name, group, policy or access key. If the user name is specified, the function can perform a get of information for this user only. Parameter aws_iam_user_name is an IAM user name. Parameters aws_iam_user_filter, aws_aim_group_filter and aws_aim_policy_filter param (all optional) are filters used to refine the user data returned. Parameter aws_iam_query_type (optional) is used to determine the type of query to perform on users.

Example workflows that use this Resilient function include `Example: AWS IAM: List Users`, `Example: AWS IAM: List Access Keys`, `Example: AWS IAM: Refresh User`, `Example: AWS IAM: Delete Access Key For Artifact`, `Example: AWS IAM: Delete Login Profile`, `Example: AWS IAM: Delete User`, `Example: AWS IAM: Delete User For Artifact`, `Example: AWS IAM: Get Access Key For Artifact` and `Example: AWS IAM: Get User For Artifact`.

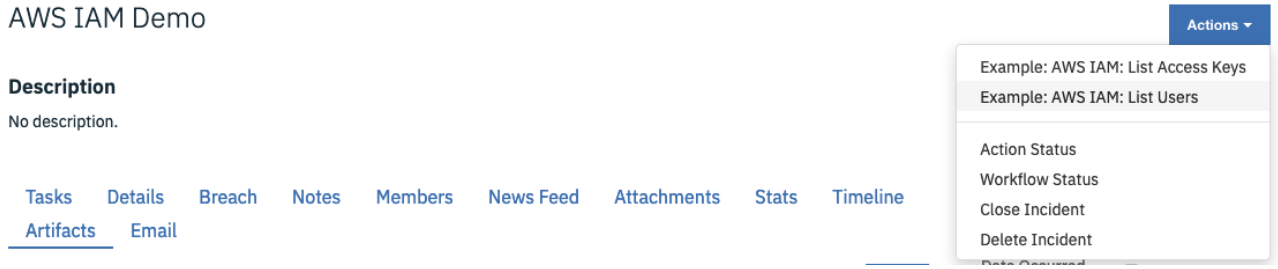
The workflow, `Example: AWS IAM: List Users`, sets the following input fields for the function:

- aws_iam_user_filter (optional) is mapped to an activity field input. Note: Input should be a valid regular expression.
- aws_iam_group_filter (optional) is mapped to an activity field input. Note: Input should be a valid regular expression.
- aws_iam_policy_filter (optional) is mapped to an activity field input. Note: Input should be a valid regular expression.
- aws_iam_access_key_filter (optional) is mapped to an activity field input. Note: Input should be a valid regular expression.

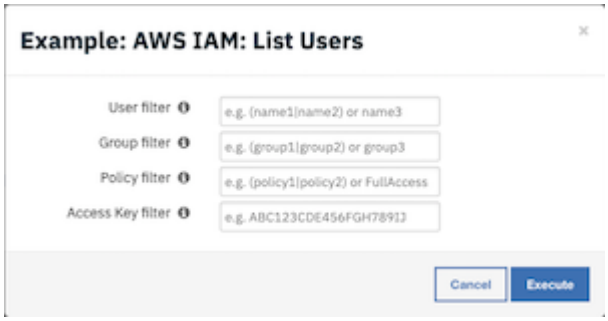
- aws_iam_query_type is set to value `users`.

The workflow is initiated by the incident rule, `Example: AWS IAM: List Users`.

1. Open an incident and select `Example: AWS IAM: List Users` from Actions.



2. The user is presented with a list of input fields which can be used to filter users using regular expressions. Set any desired filters.



3. Press Execute to invoke the `Example: AWS IAM: List Users` workflow, which calls the `AWS IAM: List Users` function.

On successful completion of the workflow, the data table `AWS IAM Users` is updated in the Resilient platform with the users' properties for the selected AWS account.

AWS IAM Users

Search... Print Export

Query execution date	User name	Login Profile exists	Access key ids	Groups	Policies	Tags	User Arn	Create date	Default user	Status
2020-03-11 16:52:04	adminuser	Yes	AKIA4EQBBG2YO3VWDSN6,AKIA4EQBBG2YP4S4SOEV	system-admins	AmazonRoute53ReadOnlyAccess	Name,Email,Environment,Account_Type	arn:aws:iam::834299573936:user/jprendergast	2019-10-31 16:23:07	Yes	Active
2020-03-11 16:52:04	iam_test_user_9	Yes	AKIA4EQBBG2YGRAWWO4M,AKIA4EQBBG2YNBHEKB7P	denyall_group	–	–	arn:aws:iam::834299573936:user/iam_test_user_9	2020-02-25 10:38:32	–	Active
2020-03-11 16:52:04	iam_test_user_8	Yes	AKIA4EQBBG2YFOZGYFMT,AKIA4EQBBG2YIJV64CUB	–	–	–	arn:aws:iam::834299573936:user/iam_test_user_8	2020-03-11 16:50:37	–	Active
2020-03-11 16:52:04	iam_test_user_7	Yes	AKIA4EQBBG2YNSS34245,AKIA4EQBBG2YO6VND6P3	null_group,denyall_group	AWSDenyAll	–	arn:aws:iam::834299573936:user/iam_test_user_7	2020-02-19 11:04:33	–	Active
2020-03-11 16:52:04	iam_test_user_6	Yes	AKIA4EQBBG2YFUVZHM5D,AKIA4EQBBG2YDZNWBORP	–	–	–	arn:aws:iam::834299573936:user/iam_test_user_6	2020-03-11 16:50:35	–	Active
2020-03-11 16:52:04	iam_test_user_5	Yes	AKIA4EQBBG2YL57R2BX3,AKIA4EQBBG2YKN74TQH5	–	–	–	arn:aws:iam::834299573936:user/iam_test_user_5	2020-03-11 16:50:35	–	Active
2020-03-11 16:52:04	iam_test_user_4	Yes	AKIA4EQBBG2YAIACVUFX,AKIA4EQBBG2YMOOQWX6F	myS3group	deny_all	–	arn:aws:iam::834299573936:user/iam_test_user_4	2020-02-07 12:37:06	–	Active
2020-03-11 16:52:04	iam_test_user_3	Yes	AKIA4EQBBG2YFDHXQC42,AKIA4EQBBG2YFBVKMMSH	myS3group	inline_policy,AWSDenyAll	–	arn:aws:iam::834299573936:user/iam_test_user_3	2020-02-07 12:37:06	–	Active
2020-03-11 16:52:04	iam_test_user_2	Yes	AKIA4EQBBG2YCNNCIYP5,AKIA4EQBBG2YIFZBWDMY	null_group,jqgroup,denyall_group	AWSDenyAll	–	arn:aws:iam::834299573936:user/iam_test_user_2	2020-02-07 12:37:06	–	Active
2020-03-11 16:52:04	iam_test_user_13	Yes	AKIA4EQBBG2YOS74BMU6,AKIA4EQBBG2YAXR6ISXO	–	–	–	arn:aws:iam::834299573936:user/iam_test_user_13	2020-03-11 16:49:38	–	Active

Note: If all unfiltered users are listed, the default user for the integration is indicated by "Yes" in the "Default user" field.

▶ Inputs:

Name	Type	Required	Example	Tooltip
`aws_iam_access_key_filter`	`text`	No	–	Filter users or access keys based on access keys applied to user. Filter by access key ID. Can be a string or regular expression.
`aws_iam_group_filter`	`text`	No	–	Filter users based on group membership. Filter by group name. Can be a string or regular expression.
`aws_iam_policy_filter`	`text`	No	–	Filter users based on policies applied to user. Filter by policy name. Can be a string or regular expression.
`aws_iam_query_type`	`select`	No	–	Type of query to perform for list_users, can be one of 'users' or 'access_keys'. Optional parameter.

Name	Type	Required	Example	Tooltip
aws_iam_user_filter	text	No	-	Filter users or access keys based on user name. Can be a string or regular expression.
aws_iam_user_name	text	No	AWS IAM user name	AWS IAM user name.

▶ Outputs:

```
results = {
            'version': '1.0', 'success': True, 'reason': None,
            'content': [{'Path': '/', 'UserName': 'iam_test_User',
'UserId': 'AIDA4EQBBG2YDOLTU6QSM',
                         'Arn':
'arn:aws:iam::123456789123:user/iam_test_User', 'CreateDate': '2019-11-05
15:54:43'},
                        {'Path': '/', 'UserName': 'iam_test_User_2',
'UserId': 'AIDA4EQBBG2YGZOQXT2JB',
                         'Arn':
'arn:aws:iam::123456789123:user/iam_test_User_2',
                         'CreateDate': '2019-10-31 16:23:07',
'PasswordLastUsed': '2019-11-12 10:55:42'}
                        ],
            'raw': '[{"Path": "/", "UserName": "iam_test_User", "UserId":
"AIDA4EQBBG2YDOLTU6QSM", "Arn":
"arn:aws:iam::834299573936:user/iam_test_User", "CreateDate": "2019-11-05
15:54:43"}, {"Path": "/", "UserName": "iam_test_User_2", "UserId":
"AIDA4EQBBG2YGZOQXT2JB", "Arn":
"arn:aws:iam::834299573936:user/iam_test_User_2", "CreateDate": "2019-10-
31 16:23:07"}]',
            'inputs': {},
            'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
'package_version': '1.0.0',
                        'host': 'myhost.ibm.com', 'execution_time_ms':
7951,
                        'timestamp': '2019-11-14 13:48:30'
                       }
}
```

▶ Example Pre-Process Script:

```
import re

# Get a list of all enabled filters.
ENABLED_FILTERS = [f for f in [rule.properties.aws_iam_user_filter,
rule.properties.aws_iam_group_filter,
```

```
                                rule.properties.aws_iam_policy_filter,
rule.properties.aws_iam_access_key_filter]
                    if f is not None]


def is_regex(regex_str):
    """Test if sting is a correctly formed regular expression.

    :param regex_str: Regular expression string.
    :return: Boolean.
    """
    try:
        re.compile(regex_str)
        return True
    except re.error:
        return False


def main():
    # Test any enabled filters to ensure they are valid regular
expressions.
    for ef in (ENABLED_FILTERS):
        if not is_regex(ef):
            raise ValueError("The query filter '{}' is not a valid regular
expression.".format(unicode(ef)))

    inputs.aws_iam_user_filter = rule.properties.aws_iam_user_filter
    inputs.aws_iam_group_filter = rule.properties.aws_iam_group_filter
    inputs.aws_iam_policy_filter = rule.properties.aws_iam_policy_filter
    inputs.aws_iam_access_key_filter =
rule.properties.aws_iam_access_key_filter
    inputs.aws_iam_query_type = "users"


if __name__ == "__main__":
    main()
```

▶ Example Post-Process Script:

```
##  AWS IAM - fn_aws_iam_list_users script ##
#  Globals
import re
# List of fields in datatable fn_aws_iam_list_users script
DATA_TBL_FIELDS = ["query_execution_time", "UserName", "Arn",
"DefaultUser", "CreateDate", "LoginProfileExists",
                   "AccessKeyIds", "Policies", "Tags", "Groups"]
FN_NAME = "fn_aws_iam_list_users"
WF_NAME = "List Users"
# Processing
CONTENT = results.content
INPUTS = results.inputs
QUERY_EXECUTION_DATE = results["metrics"]["timestamp"]
```

```
note_text = ''

def check_add_quotes(tag_name):
    # Using regex
    # If spaces in tag name add quotes
    if re.search(r"\s", tag_name):
        return "'"+tag_name+"'"
    else:
        return tag_name

def process_access_key_ids(access_key_id_list, row):
    access_key_ids = []
    for ak_id in access_key_id_list:
        if ak_id["AccessKeyId"] is not None:
            access_key_ids.append(ak_id["AccessKeyId"])
    row.AccessKeyIds = ','.join(access_key_ids)

def process_policies(policy_list, row):
    policies = []
    for pol in policy_list:
        if pol["PolicyName"] is not None:
            policies.append(pol["PolicyName"])
    row.Policies = ','.join(policies)

def process_groups(group_list, row):
    groups = []
    for grp in group_list:
        if grp["GroupName"] is not None:
            groups.append(grp["GroupName"])
    row.Groups = ",".join(groups)

def process_tags(tag_list, row):
    tags = []
    for tag in tag_list:
        if tag["Key"] is not None:
            tags.append(tag["Key"])
    row.Tags = ','.join(check_add_quotes(t) for t in tags)

def main():
    note_text = u''
    filters = [f for f in [INPUTS["aws_iam_user_filter"],
INPUTS["aws_iam_group_filter"],
                           INPUTS["aws_iam_policy_filter"],
INPUTS["aws_iam_access_key_filter"]]
               if f is not None]
    if CONTENT:
        note_text = "AWS IAM Integration: Workflow <b>{0}</b>: There were
<b>{1}</b> user(s) returned for Resilient function " \
                    "<b>{2}</b>.".format(WF_NAME, len(CONTENT), FN_NAME)
        note_text += "<br>Adding new row(s) to data table <b>{0}</b> for
<b>{1}</b> user(s).</br>".format("AWS IAM Users", len(CONTENT))
        for u in CONTENT:
            newrow = incident.addRow("aws_iam_users")
            newrow.query_execution_date = QUERY_EXECUTION_DATE
```

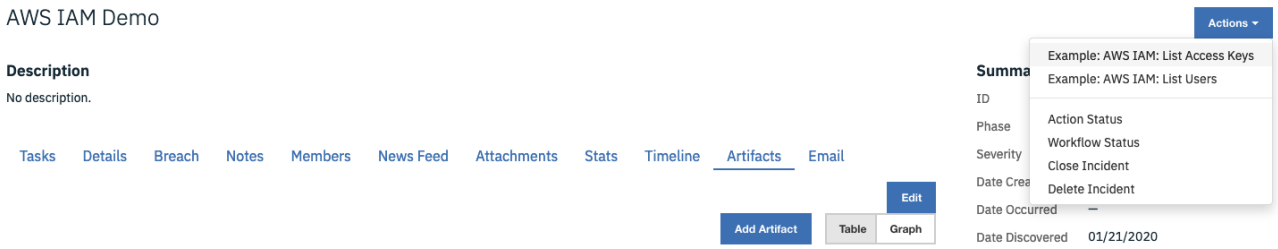
```
            for f in DATA_TBL_FIELDS:
                newrow.Status = "Active"
                if u[f] is not None:
                    if isinstance(u[f], unicode) or isinstance(u[f], int)
\
                            or isinstance(u[f], long) or len(u[f]) == 0:
                        if f == "DefaultUser" and not u[f]:
                            pass
                        else:
                          newrow[f] = u[f]
                    else:
                        if f == "AccessKeyIds" and len(u[f]) > 0:
                            process_access_key_ids(u[f], newrow)
                        elif f == "Policies" and len(u[f]) > 0:
                            process_policies(u[f], newrow)
                        elif f == "Groups" and len(u[f]) > 0:
                            process_groups(u[f], newrow)
                        elif f == "Tags" and len(u[f]) > 0:
                            process_tags(u[f], newrow)
                        else:
                            newrow[f] = ','.join(u[f])
    else:
        note_text += "AWS IAM Integration: Workflow <b>{0}</b>: There were
<b>no</b> results returned for Resilient function <b>{1}</b>."\
            .format(WF_NAME, FN_NAME)
    if filters:
        note_text += "<br>Query Filters:</br>"
        if INPUTS.get("aws_iam_user_filter"):
            note_text += u"<br>aws_iam_user_filter: <b>{0}</b>
</br>".format(INPUTS["aws_iam_user_filter"])
        if INPUTS.get("aws_iam_group_filter"):
            note_text += u"<br>aws_iam_group_filter: <b>{0}</b>
</br>".format(INPUTS["aws_iam_group_filter"])
        if INPUTS.get("aws_iam_policy_filter"):
            note_text += u"<br>aws_iam_policy_filter: <b>{0}</b>
</br>".format(INPUTS["aws_iam_policy_filter"])
        if INPUTS.get("aws_iam_access_key_filter"):
            note_text += u"<br>aws_iam_access_key_filter: <b>{0}</b>
</br>".format(INPUTS["aws_iam_access_key_filter"])
    incident.addNote(helper.createRichText(note_text))
if __name__ == "__main__":
    main()
```

The workflow, `Example: AWS IAM: List Access keys`, sets the following input fields for the function:

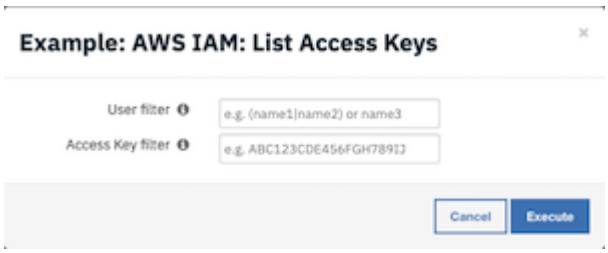
- aws_iam_user_filter (optional) is mapped to an activity field input. Note: Input should be a valid regular expression.
- aws_iam_access_key_filter (optional) is mapped to an activity field input. Note: Input should be a valid regular expression.
- aws_iam_query_type is set to value `access_keys`.

The workflow is initiated by the incident rule, `Example: AWS IAM: List Access keys`.

1. Open an incident and select `Example: AWS IAM: List Access keys` from Actions.



2. The user is presented with a list of input fields which can be used to filter users using regular expressions. Set any desired filters.



3. Press Execute to invoke the `Example: AWS IAM: List Access keys` workflow, which calls the `AWS IAM: List Users` function.

On successful completion of the workflow, the data table `AWS IAM Access Keys` is updated in the Resilient platform with the users' properties for the selected AWS account.

AWS IAM Access Keys

Search... + Row

Query execution date	Access key id	User name	Create date	Status	Default key	Last used date	Service name
2020-02-07 14:10:42	AKIA4EQBBG2YO3VWDSN6	adminuser	2019-10-31 16:23:08	Active	—	—	N/A
2020-02-07 14:10:42	AKIA4EQBBG2YFGH789IJ	adminuser	2019-11-04 11:33:33	Active	Yes	2020-02-07 12:38:00	iam
2020-02-07 14:10:42	AKIA4EQBBG2YHCALR7UT	iam_test_user_1	2020-02-07 12:37:08	Active	—	—	N/A
2020-02-07 14:10:42	AKIA4EQBBG2YCNNCIYP5	iam_test_user_2	2020-02-07 12:37:08	Active	—	—	N/A
2020-02-07 14:10:42	AKIA4EQBBG2YLHE37O6A	iam_test_user_3	2020-02-07 12:37:08	Active	—	—	N/A
2020-02-07 14:10:42	AKIA4EQBBG2YAIACVUFX	iam_test_user_4	2020-02-07 12:37:08	Active	—	—	N/A
2020-02-07 14:10:42	AKIA4EQBBG2YNUSUX3GT	iam_test_user_5	2020-02-07 12:37:08	Active	—	—	N/A
2020-02-07 14:10:42	AKIA4EQBBG2YHQAOWDWO	iam_test_user_6	2020-02-07 12:37:09	Active	—	—	N/A
2020-02-07 14:10:42	AKIA4EQBBG2YGLNUPO64	iam_test_user_1	2020-02-07 12:37:09	Active	—	—	N/A

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Note: If all unfiltered access keys are listed, the key for the default user for the integration is indicated by "Yes" in the "Default key" field.

▶ Inputs:

Name	Type	Required	Example	Tooltip

Name	Type	Required	Example	Tooltip
aws_iam_access_key_filter	text	No	-	Filter users or access keys based on access keys applied to user. Filter by access key ID. Can be a string or regular expression.
aws_iam_group_filter	text	No	-	Filter users based on group membership. Filter by group name. Can be a string or regular expression.
aws_iam_policy_filter	text	No	-	Filter users based on policies applied to user. Filter by policy name. Can be a string or regular expression.
aws_iam_query_type	select	No	-	Type of query to perform for list_users, can be one of 'users' or 'access_keys'. Optional parameter.
aws_iam_user_filter	text	No	-	Filter users or access keys based on user name. Can be a string or regular expression.
aws_iam_user_name	text	No	AWS IAM user name	AWS IAM user name.

▶ Outputs:

```
results =  {
            'version': '1.0', 'success': True, 'reason': None,
            'content': [{'Path': '/', 'UserName': 'iam_test_User',
'UserId': 'AIDA4EQBBG2YDOLTU6QSM',
                         'Arn':
'arn:aws:iam::123456789123:user/iam_test_User', 'CreateDate': '2019-11-05
15:54:43'},
                        {'Path': '/', 'UserName': 'iam_test_User_2',
'UserId': 'AIDA4EQBBG2YGZOQXT2JB',
                         'Arn':
'arn:aws:iam::123456789123:user/iam_test_User_2',
                         'CreateDate': '2019-10-31 16:23:07',
'PasswordLastUsed': '2019-11-12 10:55:42'}
                       ],
            'raw': '[{"Path": "/", "UserName": "iam_test_User", "UserId":
"AIDA4EQBBG2YDOLTU6QSM", "Arn":
"arn:aws:iam::834299573936:user/iam_test_User", "CreateDate": "2019-11-05
```

```
15:54:43"}, {"Path": "/", "UserName": "iam_test_User_2", "UserId":
"AIDA4EQBBG2YGZOQXT2JB", "Arn":
"arn:aws:iam::834299573936:user/iam_test_User_2", "CreateDate": "2019-10-
31 16:23:07"}]',
            'inputs': {},
            'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
'package_version': '1.0.0',
                        'host': 'myhost.ibm.com', 'execution_time_ms':
7951,
                        'timestamp': '2019-11-14 13:48:30'
                       }
}
```

▶ Example Pre-Process Script:

```
inputs.aws_iam_access_key_filter =
rule.properties.aws_iam_access_key_filter
inputs.aws_iam_user_filter = rule.properties.aws_iam_user_filter
inputs.aws_iam_query_type = "access_keys"
```

▶ Example Post-Process Script:

```
##  AWS IAM - fn_aws_iam_list_users script ##
#  Globals
import re
# List of fields in datatable fn_aws_iam_list_users script main
DATA_TBL_FIELDS = ["query_execution_time", "UserName", "AccessKeyId",
"CreateDate", "Status", "DefaultKey"]
# List of fields in datatable fn_aws_iam_list_users script last used
access keys.
DATA_TBL_FIELDS_LUAK = ["LastUsedDate", "ServiceName", "Region"]
FN_NAME = "fn_aws_iam_list_users"
WF_NAME = "List Access Keys"
# Processing
CONTENT = results.content
INPUTS = results.inputs
QUERY_EXECUTION_DATE = results["metrics"]["timestamp"]

def process_access_keys(access_key_id_list, user_name):
    access_key_ids = []
    for ak_id in access_key_id_list:
        newrow = incident.addRow("aws_iam_access_keys")
        newrow.query_execution_date = QUERY_EXECUTION_DATE
        newrow.UserName = user_name
        for f in DATA_TBL_FIELDS[2:]:
            if ak_id[f] is not None:
                newrow[f] = ak_id[f]
        # Add key last used data if it exists.
        if ak_id["key_last_used"] is not None:
```

```
            luak = ak_id["key_last_used"]
            for l in DATA_TBL_FIELDS_LUAK:
                if luak[l] is not None:
                    newrow[l] = luak[l]
def main():
    note_text = u''
    filters = [f for f in [INPUTS["aws_iam_user_filter"],
INPUTS["aws_iam_group_filter"],
                           INPUTS["aws_iam_policy_filter"],
INPUTS["aws_iam_access_key_filter"]]
               if f is not None]
    if CONTENT:
        key_count = 0
        for u in CONTENT:
           if u["AccessKeyIds"]:
                for k in  u["AccessKeyIds"]:
                    key_count += 1
        note_text = "AWS IAM Integration: Workflow <b>{0}</b>: There were
<b>{1}</b> access keys(s) returned for Resilient function " \
                    "<b>{2}</b>.".format(WF_NAME, key_count, FN_NAME)
        note_text += "<br>Adding new rows to data table <b>{0}</b> for <b>
{1}</b> access keys(s).</br>".format("AWS IAM Access Keys", key_count)
        for u in CONTENT:
           if u["AccessKeyIds"]:
                user_name = u["UserName"]
                process_access_keys(u["AccessKeyIds"], user_name)

    else:
        note_text += "AWS IAM Integration: Workflow <b>{0}</b>: There were
<b>no</b> results returned for Resilient function <b>{1}</b>."\
            .format(WF_NAME, FN_NAME)

    if filters:
        note_text += "<br>Query Filters:</br>"
        if INPUTS.get("aws_iam_user_filter"):
            note_text += u"<br>aws_iam_user_filter: <b>{0}</b>
</br>".format(INPUTS["aws_iam_user_filter"])
        if INPUTS.get("aws_iam_access_key_filter"):
            note_text += u"<br>aws_iam_access_key_filter: <b>{0}</b>
</br>".format(INPUTS["aws_iam_access_key_filter"])
    incident.addNote(helper.createRichText(note_text))
if __name__ == "__main__":
    main()
```

Function - AWS IAM: Delete User

Delete the specified IAM user. Parameter aws_iam_user_name is an IAM user name.

When deleting an IAM user programmatically, the workflow deletes or removes the following items attached to the user:

```
Password
Access keys
Inline policies
Attached managed policies
Group memberships
Signing certificates
SSH public keys
Service specific credentials
Deactivate Multi-factor authentication (MFA) devices
Delete virtual MFA Devices
```

Example workflows that use this Resilient function include `Example: AWS IAM: Delete User` or `Example: AWS IAM: Delete User For Artifact`.

Both of the example workflows are multi-step functions and will attempt to remove or delete the items referenced above if associated with the user, and then attempt to delete the user.

If any of the items mentioned above exist for the user, the workflow will fail.

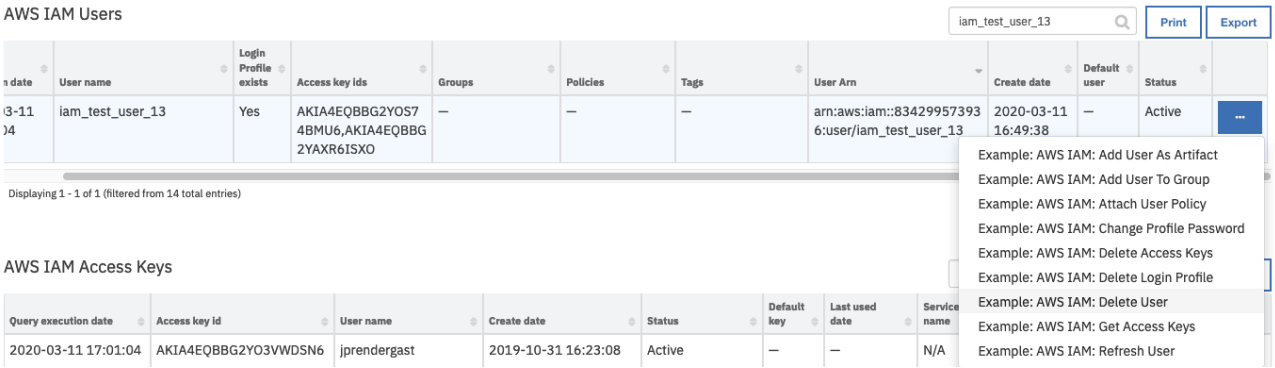
The workflow, `Example: AWS IAM: Delete User`, sets the following input field for the function:

- aws_iam_user_name is mapped to a user name from the selected data table row `Example: AWS IAM: Delete User` or artifact.

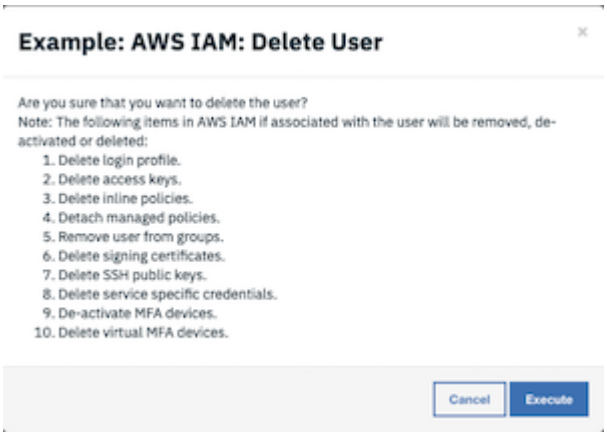
The workflow is initiated by the data table rule, `Example: AWS IAM: Delete User`.

1. Open an incident and select the row of data table `AWS IAM Users` corresponding to the user whose access keys are to be deleted.

2. From the selected row's actions menu, select `Example: AWS IAM: Delete User`.



The user is presented with a warning and an option to Execute or Cancel.



3. Press Execute to invoke the `Example: AWS IAM: Delete User` workflow, which calls the `AWS IAM: Delete User` function.

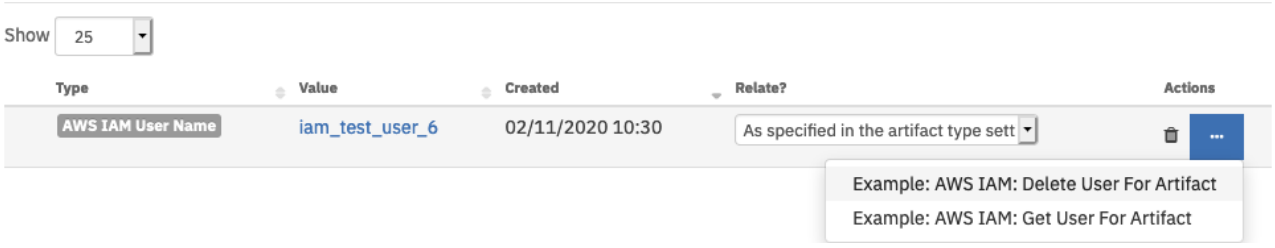
On successful completion of the workflow, the data table `AWS IAM Users` is refreshed in the Resilient platform with the updated access key details for the selected user. The `Status` field of the data table transitions to `Deleted`.

The workflow, `Example: AWS IAM: Delete User For Artifact`, sets the following input fields for the function:

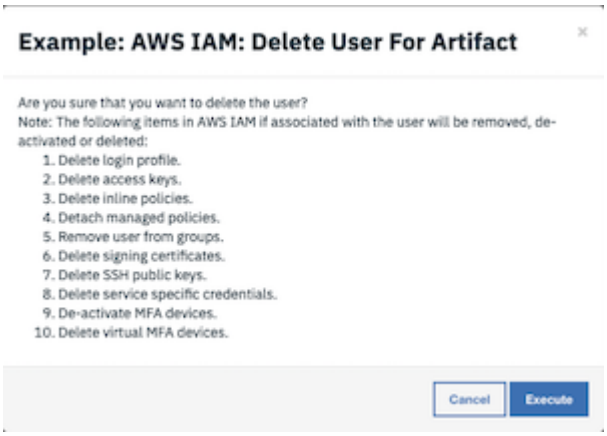
- aws_iam_user_name is mapped to an artifact value for artifact of type `AWS IAM User Name`.

The workflow is initiated by the artifact rule, `Example: AWS IAM: Delete User For Artifact`.

1. Open an incident and select the 'Artifacts' tab.
2. For a Resilient artifact of type, 'AWS IAM User Name', click Action-> `Example: AWS IAM: Delete User For Artifact`.

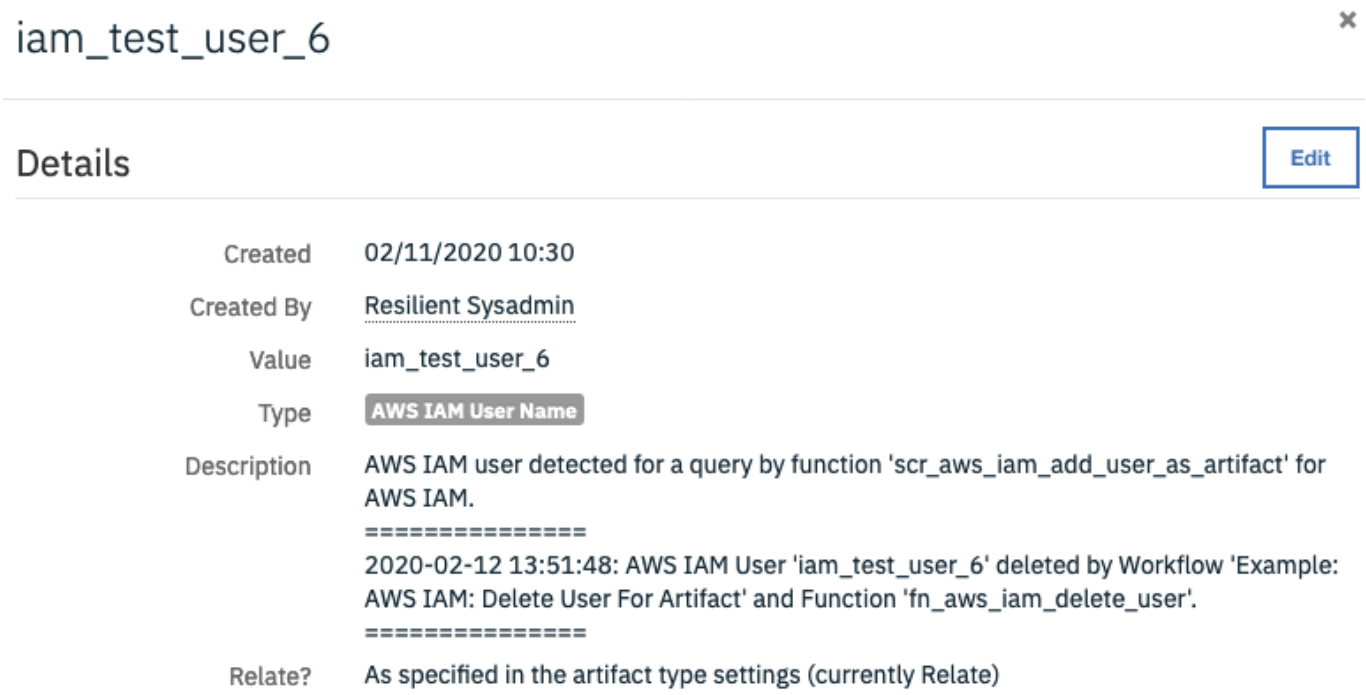


The user is presented with a warning and an option to Execute or Cancel.



3. Press Execute to invoke the `Example: AWS IAM: Delete User For Artifact` workflow, which calls the `AWS IAM: Delete User` function.

On successful completion of the workflow, the artifact description is updated with details of the user deletion.



▶ Inputs:

Name	Type	Required	Example	Tooltip
`aws_iam_user_name`	`text`	Yes	`AWS IAM user name`	AWS IAM user name.

▶ Outputs:

```
results = { 'version': '1.0', 'success': True, 'reason': None,
            'content': 'OK',
            'raw': '"OK"',
            'inputs': {'aws_iam_user_name': 'iam_test_user'},
            'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
'package_version': '1.0.0', 'host': 'myhost.ibm.com',
                        'execution_time_ms': 689, 'timestamp': '2020-01-15
10:27:48'
```

```
                        }
}
```

▶ Example Pre-Process Script:

```
inputs.aws_iam_user_name = row.UserName
```

▶ Example Post-Process Script:

```
##  AWS IAM - fn_aws_iam_delete_access_keys script ##
#  Globals
# List of fields in datatable for fn_aws_iam_delete_user  script
DATA_TBL_FIELDS = ["Status"]
FN_NAME = "fn_aws_iam_delete_user"
WF_NAME = "Delete User"
# Processing
CONTENT = results.content
INPUTS = results.inputs

def main():
    note_text = ''
    if CONTENT:
        if CONTENT == "OK":
            note_text = "AWS IAM Integration: : Workflow <b>{0}</b>: User
<b>{1}</b> was successfully deleted for " \
                        "Resilient function <b>{2}</b>.".format(WF_NAME,
INPUTS["aws_iam_user_name"], FN_NAME)
            row.Status = "Deleted"
            row.Tags = ''
        else:
            note_text = "AWS IAM Integration: : Workflow <b>{0}</b>:
Unexpected delete status <b>{1}</b> for delete" \
                        " user operation <b>{2}</b> for Resilient function
<b>{3}</b>."\
                .format(WF_NAME, CONTENT, INPUTS["aws_iam_user_name"],
FN_NAME)
    else:
        note_text += "AWS IAM Integration: Workflow <b>{0}</b>: There was
no result returned for Resilient function <b>{0}</b>."\
            .format(WF_NAME, FN_NAME)

    incident.addNote(helper.createRichText(note_text))
if __name__ == "__main__":
    main()
```

Function - AWS IAM: List User Access Key IDs

Gets information about the access key IDs associated with the specified IAM user. Parameter aws_iam_user_name is an IAM user name.

Example workflows that use this Resilient function include `Example: AWS IAM: Delete Access Keys`, `Example: AWS IAM: Refresh User`, `Example: AWS IAM: Get User For Artifact`, `Example: AWS IAM: Delete User` or `Example: AWS IAM: Delete User For Artifact`.

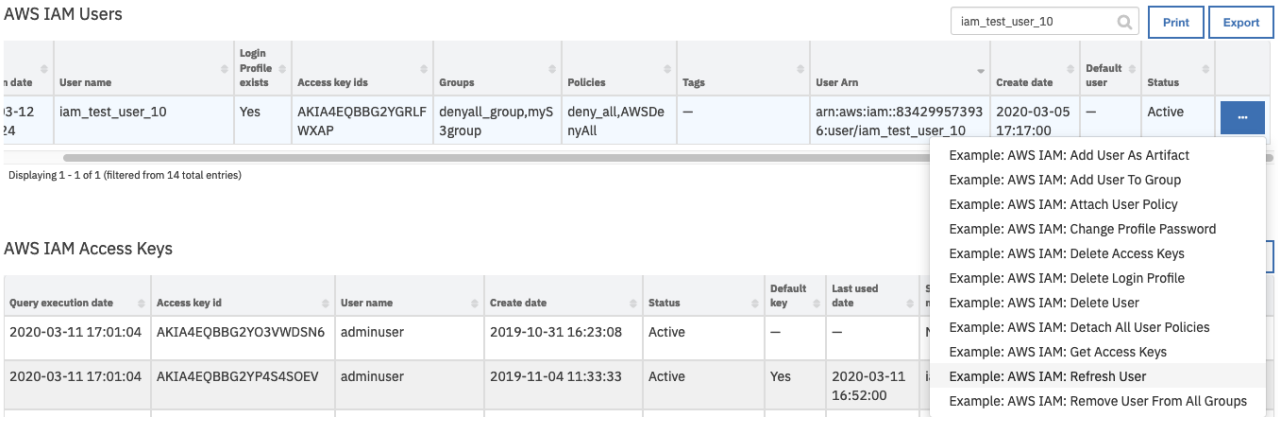
The workflow, `Example: AWS IAM: Refresh User`, sets the following input field for the function:

- aws_iam_user_name is mapped to a user name from the selected data table row.

The workflow is initiated by the data table rule, `Example: AWS IAM: Refresh User`.

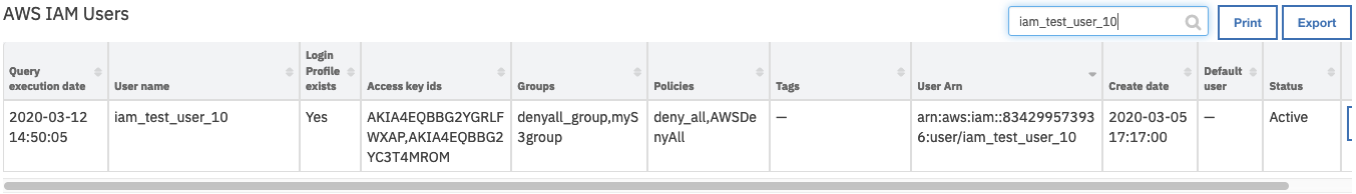
1. Open an incident and select the row of data table `AWS IAM Users` corresponding to the user which is to have its properties refreshed for the data table.

2. From the selected row's actions menu, select `Example: AWS IAM: Refresh User`.



3. Press Execute to invoke the `Example: AWS IAM: Refresh User` workflow, which calls the `AWS IAM: List User Access Key IDs` function.

On successful completion of the workflow, the `Access key ids` field of the `AWS IAM Users` data table is updated for the selected user.



▶ Inputs:

Name	Type	Required	Example	Tooltip
`aws_iam_user_name`	`text`	Yes	`AWS IAM user name`	AWS IAM user name.

▶ Outputs:

```
results = {
        'version': '1.0', 'success': True, 'reason': None,
        'content': [{'UserName': 'iam_test_User', 'AccessKeyId':
```

```
'AKIA4EQBBG2YKXYJB55L',
                      'Status': 'Active', 'CreateDate': '2019-11-12
11:09:38'
                     }
                    ],
          'raw': '[{"UserName": "iam_test_User", "AccessKeyId":
"AKIA4EQBBG2YKXYJB55L", "Status": "Active", "CreateDate": "2019-11-12
11:09:38"}]',
          'inputs': {'aws_iam_user_name': 'iam_test_User'},
          'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
'package_version': '1.0.0',
                      'host': 'myhost.ibm.com', 'execution_time_ms': 5365,
'timestamp': '2019-11-21 10:41:22'}
}
```

▶ Example Pre-Process Script:

```
inputs.aws_iam_user_name = row.UserName
```

▶ Example Post-Process Script:

```
##  AWS IAM - fn_aws_iam_list_user_access_keys script ##
#  Globals
# List of fields in datatable fn_aws_iam_list_user_access_keys script
DATA_TBL_FIELDS = ["AccessKeyIds"]
FN_NAME = "fn_aws_iam_list_user_access_keys"
WF_NAME = "Refresh User"
# Processing
CONTENT = results.content
INPUTS = results.inputs
note_text = ''

def main():

    if CONTENT:
        access_key_ids = []
        for ak_id in CONTENT:
            if ak_id["AccessKeyId"] is not None:
                access_key_ids.append(ak_id["AccessKeyId"])
        row.AccessKeyIds = ",".join(access_key_ids)
    else:
        row.AccessKeyIds = ""

if __name__ == "__main__":
    main()
```

Function - AWS IAM: Update Access Key

Change the status of an access key from Active to Inactive, or vice versa. Parameter aws_iam_user_name is an IAM user name. Parameter aws_iam_access_key_id is an IAM user access key id. Parameter aws_iam_status is be set to "Active" or "Inactive" to change the status of the access key.

Example workflows that use this Resilient function include `Example: AWS IAM: Deactivate Access Key`.

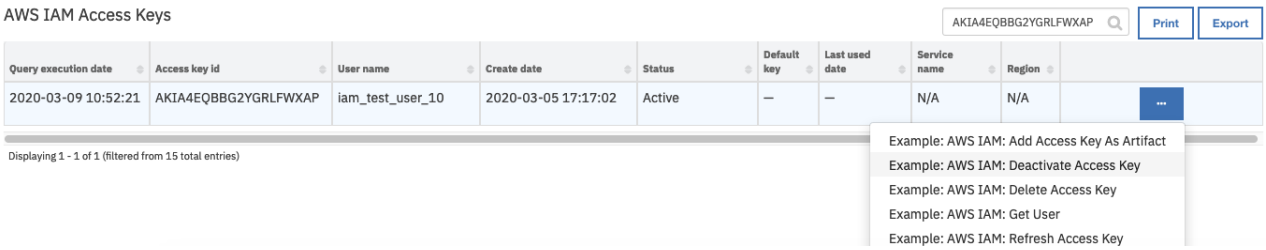
The workflow, `Example: AWS IAM: Deactivate Access Key`, sets the following input field for the function:

- aws_iam_user_name is mapped to a user name from the selected data table row.
- aws_iam_access_key_id = is mapped to an access key ID from the selected data table row.
- aws_iam_status = is set to the value "Inactive".

The workflow is initiated by the data table rule, `Example: AWS IAM: Deactivate Access Key`.

1. Open an incident and select the row of data table `AWS IAM Users` corresponding to the user which is to have its properties refreshed for the data table.

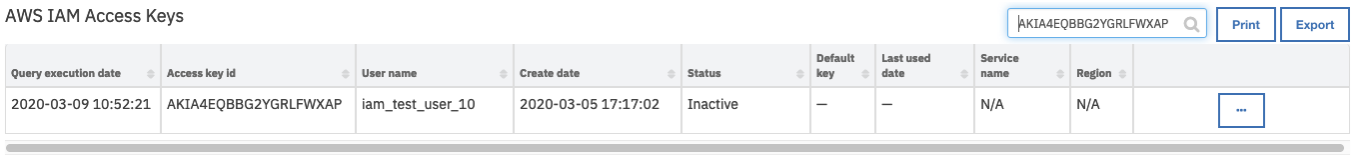
2. From the selected row's actions menu, select `Example: AWS IAM: Deactivate Access Key`.



The user is presented with a warning and an option to Execute or Cancel.

3. Press Execute to invoke the `Example: AWS IAM: Deactivate Access Key` workflow, which calls the `AWS IAM: Update Access Key` function.

On successful completion of the workflow, the `Status` field of the `AWS IAM Access Keys` data table is transitioned to `Inactive`



▶ Inputs:

Name	Type	Required	Example	Tooltip
`aws_iam_access_key_id`	`text`	No	`–`	-

Name	Type	Required	Example	Tooltip
aws_iam_status	select	No	-	-
aws_iam_user_name	text	No	AWS IAM user name	AWS IAM user name.

▶ Outputs:

```
results = {'inputs': {'aws_iam_user_name': 'iam_test_user',
'aws_iam_access_key_id': 'AKIA4EQBBG2YGLNUPO64',
                      'aws_iam_status': 'Inactive'},
           'metrics': {'package': 'fn-aws-iam', 'timestamp': '2020-02-19
12:53:48', 'package_version': '1.0.0',
                       'host': 'myhost.ibm.com', 'version': '1.0',
'execution_time_ms': 3023},
           'success': True,
           'content': 'OK',
           'raw': '"OK"',
           'reason': None,
           'version': '1.0'
}
```

▶ Example Pre-Process Script:

```
inputs.aws_iam_access_key_id = row.AccessKeyId
inputs.aws_iam_user_name = row.UserName
inputs.aws_iam_status = "Inactive"
```

▶ Example Post-Process Script:

```
#  Globals
# List of fields in datatable for fn_aws_iam_delete_access_keys  script
DATA_TBL_FIELDS = ["AccessKeyIds"]
FN_NAME = "fn_aws_iam_update_access_key"
WF_NAME = "Deactivate Access Key"
# Processing
CONTENT = results.content
INPUTS = results.inputs

def main():
    note_text = u''
    if CONTENT:
        if CONTENT == "OK":
            note_text = u"AWS IAM Integration: Workflow <b>{0}</b>: The
Access Key Id <b>{1}</b> was deactivated " \
                        u"for user <b>{2}</b> for Resilient function <b>
{3}</b>."\
                .format(WF_NAME, INPUTS["aws_iam_access_key_id"],
```

```
INPUTS["aws_iam_user_name"],  FN_NAME)
            row.Status = "Inactive"
        elif CONTENT == u"NoSuchEntity":
            note_text = u"AWS IAM Integration: Workflow <b>{0}</b>: The
Access Key Id <b>{1}</b> Not found " \
                        u"for user <b>{2}</b> for Resilient function <b>
{3}</b>."\
                .format(WF_NAME, INPUTS["aws_iam_access_key_id"],
INPUTS["aws_iam_user_name"],  FN_NAME)
            row.Status = "NoSuchEntity"
    else:
        note_text += u"AWS IAM Integration: Workflow <b>{0}</b>: There
were no results returned for " \
                     u"access key id <b>{1}</b> access key  Resilient
function <b>{2}</b>."\
            .format(WF_NAME, INPUTS["aws_iam_access_keys"], FN_NAME)

    incident.addNote(helper.createRichText(note_text))
if __name__ == "__main__":
    main()
```

Function - AWS IAM: Delete Access Keys

Delete the access key pairs associated with the specified IAM user. Parameter aws_iam_user_name is an IAM user name. Parameter aws_iam_access_keys is a comma-separated list of IAM access key IDs.

Example workflows that use this Resilient function include `Example: AWS IAM: Delete Access Keys`, `Example: AWS IAM: Delete Access Key`, `Example: AWS IAM: Delete Access Key For Artifact`, `Example: AWS IAM: Delete User` or `Example: AWS IAM: Delete User For Artifact`.

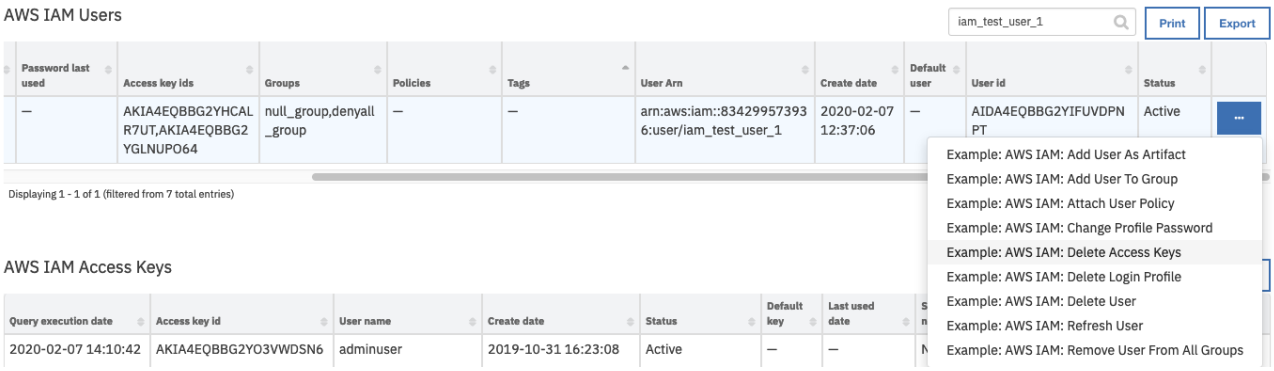
The workflow, `Example: AWS IAM: Delete Access Keys`, sets the following input fields for the function:

- aws_iam_user_name is mapped to a user name from the selected row of data table `AWS IAM Users`.
- aws_iam_access_keys is mapped to all access keys for the user from the selected row of data table `AWS IAM Users`.

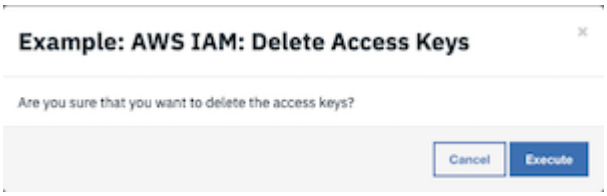
The workflow is initiated by the data table rule, `Example: AWS IAM: Delete Access Keys`.

1. Open an incident and select the row of data table `AWS IAM Users` corresponding to the user whose access keys are to be deleted.

2. From the selected row's actions menu, select `Example: AWS IAM: Delete Access Keys`.

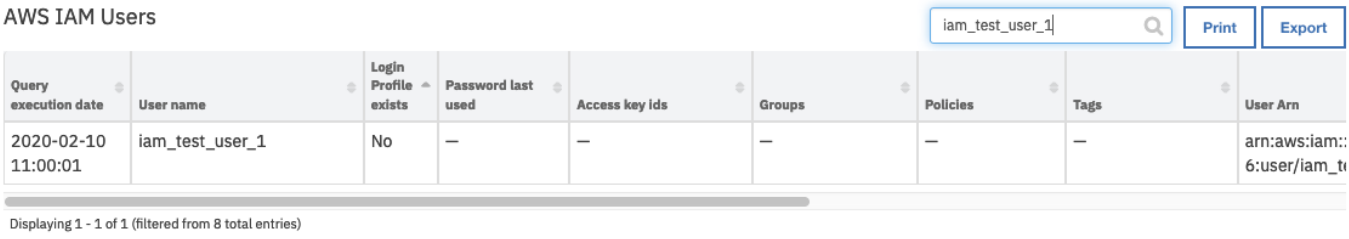


The user is presented with a warning and an option to Execute or Cancel.



3. Press Execute to invoke the `Example: AWS IAM: Delete Access Keys` workflow, which calls the `AWS IAM: Delete Access Keys` function.

On successful completion of the workflow, the `Access key ids` field of the `AWS IAM Users` data table is updated for the selected user.



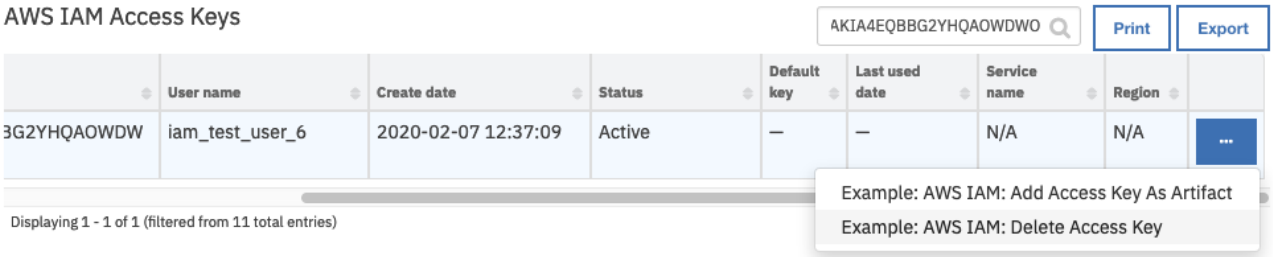
The workflow, `Example: AWS IAM: Delete Access Key`, sets the following input fields for the function:

- aws_iam_user_name is mapped to a user name from the selected row of data table `AWS IAM Access Keys`.
- aws_iam_access_keys is mapped to the access key ID from the selected row of data table `AWS IAM Access Keys`.

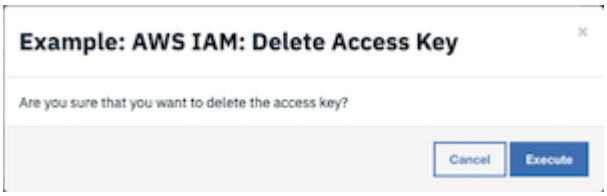
The workflow is initiated by the data table rule, `Example: AWS IAM: Delete Access Key`.

1. Open an incident and select the row of data table `AWS IAM Access Keys` corresponding to the access key to be deleted.

2. From the selected row's actions menu, select `Example: AWS IAM: Delete Access Key`.

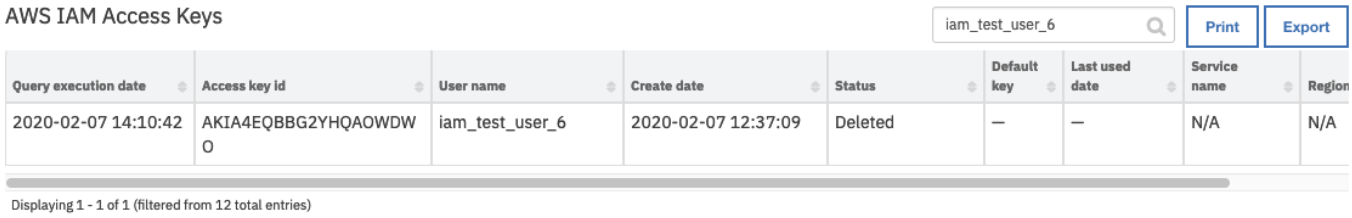


The user is presented with a warning and an option to Execute or Cancel.



3. Press Execute to invoke the `Example: AWS IAM: Delete Access Key` workflow, which calls the `AWS IAM: Delete Access Keys` function.

On successful completion of the workflow, the `Status` field of the `AWS IAM Access Keys` data table is transitioned to `Deleted`.



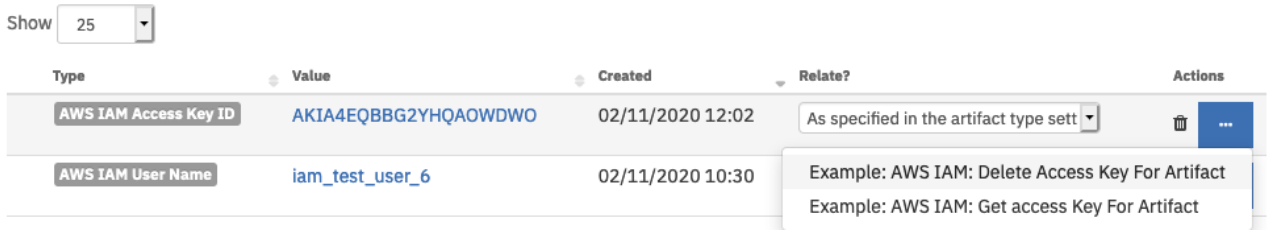
The workflow, `Example: AWS IAM: Delete Access Key For Artifact`, sets the following input fields for the function:

- aws_iam_user_name is mapped to a user name computed from a previous step in the workflow.
- aws_iam_access_keys is mapped to an artifact value for artifact of type `AWS IAM Access Key ID`.

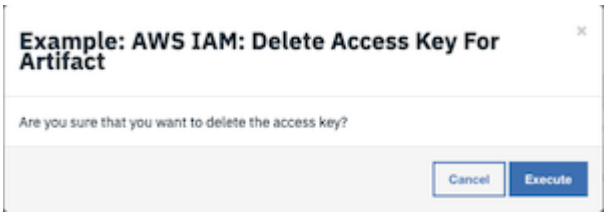
The workflow is initiated by the artifact rule, `Example: AWS IAM: Delete Access Key For Artifact`.

1. Open an incident and select the 'Artifacts' tab.

2. For a Resilient artifact of type `AWS IAM Access Key ID`, click Action-> `Example: AWS IAM: Delete Access Key For Artifact`.

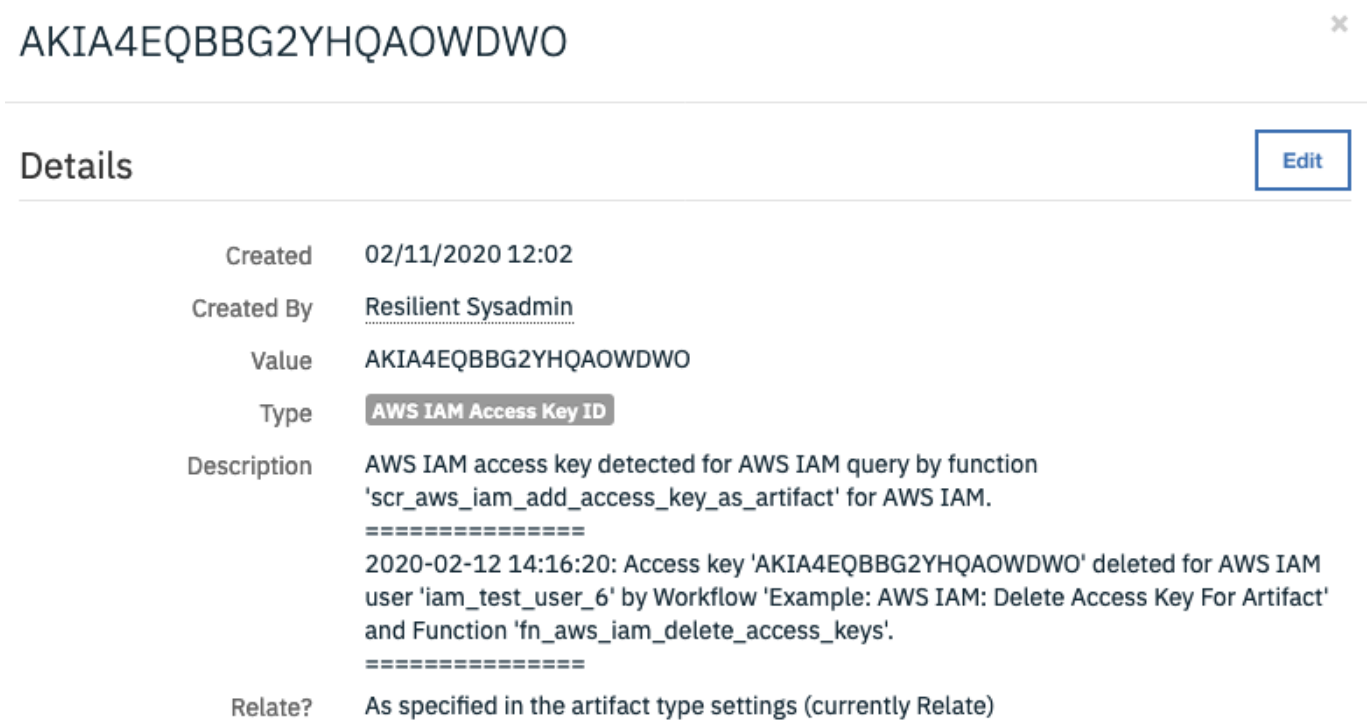


The user is presented with a warning and an option to Execute or Cancel.



3. Press Execute to invoke the `Example: AWS IAM: Delete Access Key For Artifact` workflow, which calls the `AWS IAM: Delete Access Keys` function.

On successful completion of the workflow, the artifact description is updated with details of access key deletion.



▶ Inputs:

Name	Type	Required	Example	Tooltip
aws_iam_access_keys	text	Yes	-	Comma-seperated list of AWS IAM access key names.
aws_iam_user_name	text	Yes	AWS IAM user name	AWS IAM user name.

▶ Outputs:

```
results = {'version': '1.0', 'success': True, 'reason': None,
           'content': [{'AccessKeyId': 'AKIA4EQBBG2YFAXXIG6M', 'Status':
'OK'}],
           'raw': '[{"AccessKeyId": "AKIA4EQBBG2YFAXXIG6M", "Status":
"OK"}]',
           'inputs': {'aws_iam_user_name': 'iam_test_User_1',
'aws_iam_access_keys': 'AKIA4EQBBG2YFAXXIG6M'},
           'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
'package_version': '1.0.0',
                       'host': 'myhost.ibm.com', 'execution_time_ms': 752,
'timestamp': '2020-01-16 13:47:07'
                      }
}
```

▶ Example Pre-Process Script:

```
inputs.aws_iam_user_name = row.UserName
inputs.aws_iam_access_keys = row.AccessKeyIds
```

▶ Example Post-Process Script:

```
##  AWS IAM - fn_aws_iam_delete_access_keys script ##
#  Globals
# List of fields in datatable for fn_aws_iam_delete_access_keys  script
DATA_TBL_FIELDS = ["AccessKeyIds"]
FN_NAME = "fn_aws_iam_delete_access_keys"
WF_NAME = "Delete Access Key"
# Processing
CONTENT = results.content
INPUTS = results.inputs
EXECUTION_DATE = results["metrics"]["timestamp"]

def main():
    note_text = ''
    deleted = 0
    no_such_entity = 0
    deleted_keys = []
    no_such_entity_keys = []
    if CONTENT:
        for ak_stat in CONTENT:
            if ak_stat["Status"] == "OK":
                deleted += 1
                deleted_keys.append(ak_stat["AccessKeyId"])
            else:
                no_such_entity += 1
                no_such_entity_keys.append(ak_stat["AccessKeyId"])
        if deleted_keys:
            note_text = "AWS IAM Integration: Workflow <b>{0}</b>: The
Access Key Id <b>{1}</b> was deleted " \
                        "for user <b>{2}</b> for Resilient function <b>{3}
</b>."\
                .format(WF_NAME, ','.join(deleted_keys),
INPUTS["aws_iam_user_name"],  FN_NAME)
        if no_such_entity:
            note_text = "AWS IAM Integration: : Workflow <b>{0}</b>:
Access keyId id <b>{1}</b> does not exist " \
                        "for user <b>{2}</b> for Resilient function <b>{3}
</b>."\
                .format(WF_NAME, ','.join(no_such_entity_keys),
INPUTS["aws_iam_user_name"], FN_NAME)
        row.Status = "Deleted"
        row.query_execution_date = EXECUTION_DATE
    else:
        note_text += "AWS IAM Integration: Workflow <b>{0}</b>: There were
no results returned for " \
        "access key id <b>{1}</b> access key  Resilient function <b>{2}
</b>."\
            .format(WF_NAME, INPUTS["aws_iam_access_keys"], FN_NAME)

    incident.addNote(helper.createRichText(note_text))
if __name__ == "__main__":
    main()
```

Function - AWS IAM: List User Groups

Gets the IAM groups that include the specified IAM user. Parameter aws_iam_user_name is an IAM user name.

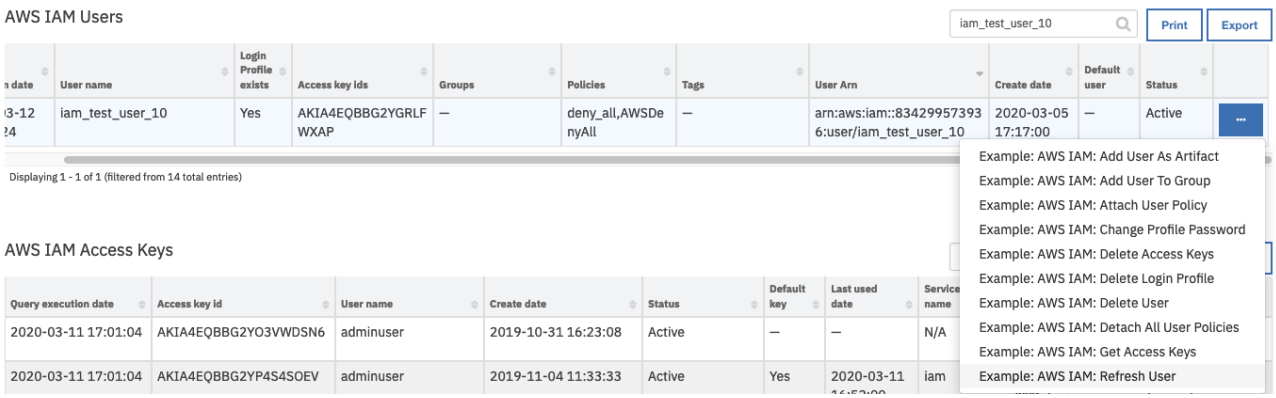
Example workflows that use this Resilient function include `Example: AWS IAM: Refresh User`, `Example: AWS IAM: Add User To Group`, `Example: AWS IAM: Remove User From All Groups`, `Example: AWS IAM: Delete User` or , `Example: AWS IAM: Delete User For Artifact`.

The workflow, `Example: AWS IAM: Refresh User`, sets the following input fields for the function:

- aws_iam_user_name is mapped to a user name from the selected row of data table `AWS IAM Users`.

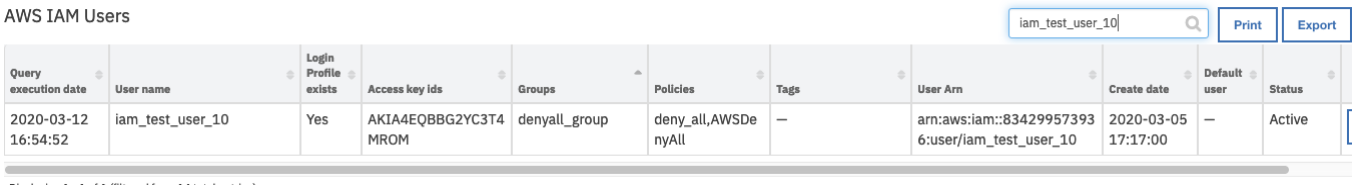
The workflow is initiated by the data table rule, `Example: AWS IAM: Refresh User`.

1. Open an incident and select the row of data table `AWS IAM Users`corresponding to the user who needs to be added to a group.
2. From the selected row's actions menu, select `Example: AWS IAM: Refresh User`.



This invokes the `Example: AWS IAM: Refresh User` workflow, which calls the `AWS IAM: List User Groups` function.

On successful completion of the workflow, the `Groups` field of the `AWS IAM Users` data table is updated for the selected user.



▶ Inputs:

Name	Type	Required	Example	Tooltip
`aws_iam_user_name`	`text`	Yes	`AWS IAM user name`	AWS IAM user name.

▶ Outputs:

```
results = {'version': '1.0', 'success': True, 'reason': None,
         'content': [{'Path': '/', 'GroupName': 'null_group', 'GroupId':
'AGPA4EQBBG2YAVPJATCNZ',
                      'Arn': 'arn:aws:iam::834299573936:group/null_group',
'CreateDate': '2019-12-04 12:31:47'},
                     {'Path': '/', 'GroupName': 'denyall_group',
'GroupId': 'AGPA4EQBBG2YPUAIHTA3E',
                      'Arn':
'arn:aws:iam::834299573936:group/denyall_group', 'CreateDate': '2019-11-29
15:49:34'},
                     {'Path': '/', 'GroupName': 'myS3group', 'GroupId':
'AGPAIH4V2XCXOME6HWCPQ',
                     'Arn': 'arn:aws:iam::834299573936:group/myS3group',
'CreateDate': '2017-05-29 20:41:50'}],
          'raw': '[{"Path": "/", "GroupName": "null_group", "GroupId":
"AGPA4EQBBG2YAVPJATCNZ",' \
                 '"Arn": "arn:aws:iam::834299573936:group/null_group",
"CreateDate": "2019-12-04 12:31:47"},' \
                 '"Path": "/", "GroupName": "denyall_group", "GroupId":
"AGPA4EQBBG2YPUAIHTA3E",' \
                 '"Arn": "arn:aws:iam::834299573936:group/denyall_group",
"CreateDate": "2019-11-29 15:49:34"},' \
                 '{"Path": "/", "GroupName": "myS3group", "GroupId":
"AGPAIH4V2XCXOME6HWCPQ",' \
                 '"Arn": "arn:aws:iam::834299573936:group/myS3group",
"CreateDate": "2017-05-29 20:41:50"}]' ,
         'inputs': {'aws_iam_user_name': 'iam_test_user_1'},
         'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
'package_version': '1.0.0', 'host': 'myhost.ie.ibm.com',
                     'execution_time_ms': 944, 'timestamp': '2020-03-16
15:43:21'
                    }
}
```

▶ Example Pre-Process Script:

```
inputs.aws_iam_user_name = row.UserName
```

▶ Example Post-Process Script:

```
##  AWS IAM - fn_aws_iam_list_user_groups script ##
#  Globals
# List of fields in datatable fn_aws_iam_list_user_groups script
DATA_TBL_FIELDS = ["Groups"]
FN_NAME = "fn_aws_iam_list_user_groups"
WF_NAME = "Refresh User"
# Processing
CONTENT = results.content
INPUTS = results.inputs
```

```
QUERY_EXECUTION_DATE = results["metrics"]["timestamp"]
note_text = ''

def main():

    if CONTENT:
        groups = []
        for grp in CONTENT:
            if grp["GroupName"] is not None:
                groups.append(grp["GroupName"])
        row.Groups = ",".join(groups)
    else:
        row.Groups = ""

if __name__ == "__main__":
    main()
```

Function - AWS IAM: Add User To Groups

Adds the specified IAM user to the specified groups. Parameter aws_iam_user_name is an IAM user name. Parameter aws_iam_group_names is a comma-separated list of IAM group names.

Example workflows that use this Resilient function include `Example: AWS IAM: Add User To Group`.

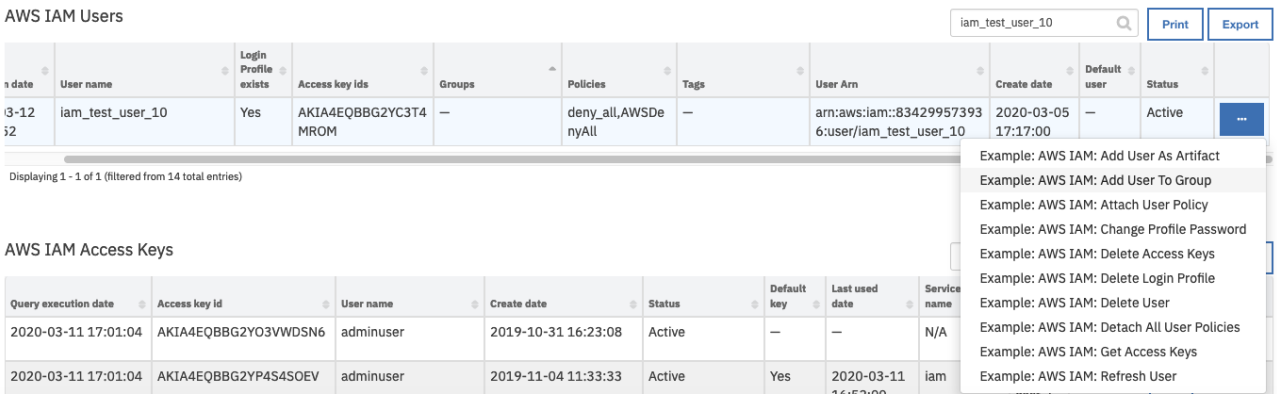
The workflow, `Example: AWS IAM: Add User To Group`, sets the following input fields for the function:

- aws_iam_user_name is mapped to a user name from the selected row of data table `AWS IAM Users`.
- aws_iam_group_names is mapped to an activity field, which is a drop-down list of group names.

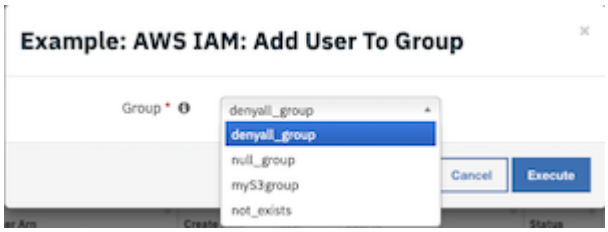
The workflow is initiated by the data table rule, `Example: AWS IAM: Add User To Group`.

1. Open an incident and select the row of data table `AWS IAM Users`corresponding to the user who needs to be added to a group.

2. From the selected row's actions menu, select `Example: AWS IAM: Add User To Group`.



3. From the drop-down list of user defined groups names, select a group and click Execute.



This invokes the `Example: AWS IAM: Add User To Group` workflow, which calls the `AWS IAM: Add User To Groups` function.

On successful completion of the workflow, the `Groups` field of the `AWS IAM Users` data table is updated for the selected user.

▶ Inputs:

Name	Type	Required	Example	Tooltip
`aws_iam_group_names`	`text`	Yes	–	Comma-separated list of AWS IAM group names.
`aws_iam_user_name`	`text`	Yes	`AWS IAM user name`	AWS IAM user name.

▶ Outputs:

```
{'version': '1.0', 'success': True, 'reason': None,
         'content': [{'GroupName': 'denyall_group', 'Status': 'OK'}],
         'raw': '[{"GroupName": "denyall_group", "Status": "OK"}]',
         'inputs': {'aws_iam_user_name': 'iam_test_user_1',
'aws_iam_group_names': 'denyall_group'},
         'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
'package_version': '1.0.0',
                     'host': 'myhost.ibm.com', 'execution_time_ms': 4303,
'timestamp': '2020-03-16 15:43:17'

                     }
}
```

▶ Example Pre-Process Script:

```
inputs.aws_iam_user_name = row.UserName
inputs.aws_iam_group_names = rule.properties.aws_iam_group
```

▶ Example Post-Process Script:

```
##  AWS IAM - fn_aws_iam_add_user_to_groups script ##
#  Globals
# List of fields in datatable for fn_aws_iam_add_user_to_groups  script
DATA_TBL_FIELDS = ["Groups"]
FN_NAME = "fn_aws_iam_add_user_to_groups"
WF_NAME = "Add User To Group"
# Processing
CONTENT = results.content
INPUTS = results.inputs
QUERY_EXECUTION_DATE = results["metrics"]["timestamp"]
note_text = ''

def main():
    note_text = ''
    added = 0
    no_such_entity = 0
    added_groups = []
    no_such_entity_groups = []
    if CONTENT:
        for grp_stat in CONTENT:
            if grp_stat["Status"] == "OK":
                added += 1
                added_groups.append(grp_stat["GroupName"])
            else:
                no_such_entity += 1
                no_such_entity_groups.append(grp_stat["GroupName"])
        if added_groups:
            note_text = "AWS IAM Integration: Workflow <b>{0}</b>: User
<b>{1}</b> added to group <b>{2}</b> " \
                        "for Resilient function <b>{3}</b>."\
                .format(WF_NAME, INPUTS["aws_iam_user_name"], ",
".join(str(i) for i in added_groups), FN_NAME)
            note_text += "<br>Refreshing data table <b>{0}</b> row for
user <b>{1}</b> with updated group data."\
                .format("AWS IAM Users", INPUTS["aws_iam_user_name"])
        if no_such_entity:
            note_text = "AWS IAM Integration: : Workflow <b>{0}</b>: The
group(s) <b>{1}</b> " \
                        "did not exist for user <b>{2}</b> for Resilient
function <b>{3}</b>."\
                .format(WF_NAME, ", ".join(str(i) for i in
no_such_entity_groups), INPUTS["aws_iam_user_name"], FN_NAME)
    else:
        note_text += "AWS IAM Integration: Workflow <b>{0}</b>: There was
no result returned for Resilient function <b>{0}</b>."\
            .format(WF_NAME, FN_NAME)

    incident.addNote(helper.createRichText(note_text))
if __name__ == "__main__":
    main()
```

Function - AWS IAM: Remove User From Groups

Removes the specified IAM user from the specified groups. Group names is a comma-separated string of group names. Parameter aws_iam_user_name is an IAM user name. Parameter aws_iam_group_names is a comma-separated list of IAM group names.

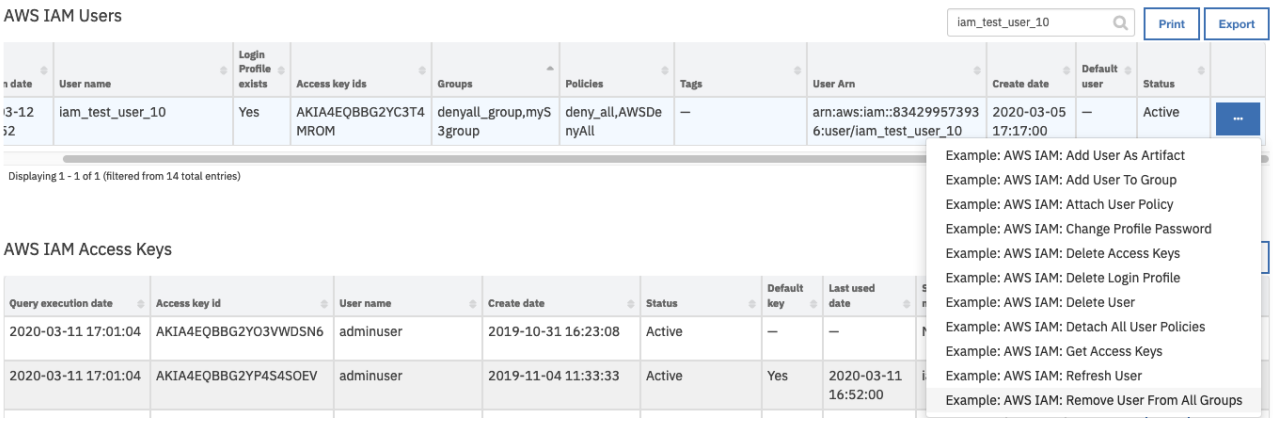
Example workflows that use this Resilient function include `Example: AWS IAM: Remove User From All Groups`, `Example: AWS IAM: Delete User` or `Example: AWS IAM: Delete User For Artifact`.

The workflow, `Example: AWS IAM: Remove User From All Groups`, sets the following input fields for the function:

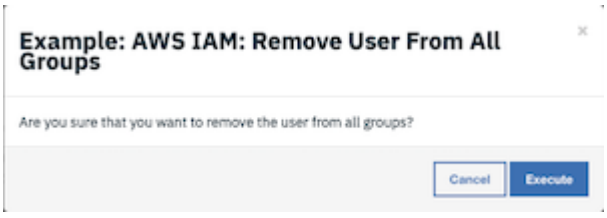
- aws_iam_user_name is mapped to a user name from the selected row of data table `AWS IAM Users`.
- aws_iam_group_names is mapped to all group names from the selected row of data table `AWS IAM Users`.

The workflow is initiated by the data table rule, `Example: AWS IAM: Remove User From All Groups`.

1. Open an incident and select the row of data table `AWS IAM Users`corresponding to the user who needs to be removed from all groups.
2. From the selected row's actions menu, select `Example: AWS IAM: Remove User From All Groups`.

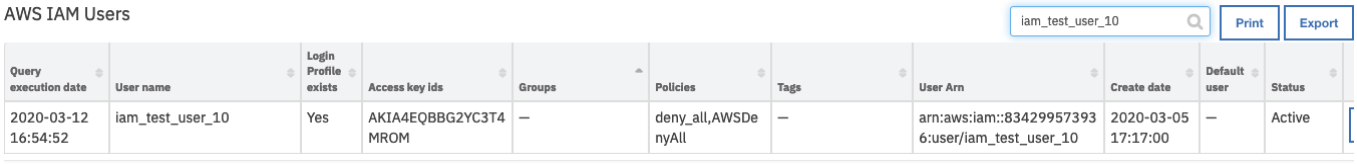


The user is presented with a warning and an option to Execute or Cancel.



3. Press Execute to invoke the `Example: AWS IAM: Remove User From All Groups` workflow, which calls the `AWS IAM: Remove User From Groups` function.

On successful completion of the workflow, the `Groups` field of the `AWS IAM Users` data table is updated to an empty value for the selected user.



▶ Inputs:

Name	Type	Required	Example	Tooltip
aws_iam_group_names	text	Yes	–	Comma-separated list of AWS IAM group names.
aws_iam_user_name	text	Yes	AWS IAM user name	AWS IAM user name.

▶ Outputs:

```
results = {
          'version': '1.0', 'success': True, 'reason': None,
          'content': [{'PolicyArn': 'arn:aws:iam::aws:policy/AWSDenyAll',
'Status': 'OK'},
                      {'PolicyArn':
'arn:aws:iam::aws:policy/AWSDenyAll_2', 'Status': 'OK'}],
          'raw': '[{"PolicyArn": "arn:aws:iam::aws:policy/AWSDenyAll",
"Status": "OK"},' \
                 '{"PolicyArn": "arn:aws:iam::aws:policy/AWSDenyAll_2",
"Status": "OK"}]',
          'inputs': {'aws_iam_arns': 'arn:aws:iam::aws:policy/AWSDenyAll',
'aws_iam_user_name': 'iam_test_User_1'},
          'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
'package_version': '1.0.0', 'host': 'myhost.ibm.com',
                      'execution_time_ms': 790, 'timestamp': '2019-11-29
12:18:30'
                    }
}
```

▶ Example Pre-Process Script:

```
inputs.aws_iam_user_name = row.UserName
inputs.aws_iam_group_names = row.Groups
```

▶ Example Post-Process Script:

```
##  AWS IAM - fn_aws_iam_detach_user_policies script ##
#  Globals
# List of fields in datatable for fn_aws_iam_detach_user_policies  script
DATA_TBL_FIELDS = ["Policies"]
FN_NAME = "fn_aws_iam_remove_user_from_groups"
WF_NAME = "Remove User From All Groups"
```

```
# Processing
CONTENT = results.content
INPUTS = results.inputs
QUERY_EXECUTION_DATE = results["metrics"]["timestamp"]
note_text = ''

def main():
    note_text = ''
    added = 0
    no_such_entity = 0
    added_groups = []
    no_such_entity_groups = []
    if CONTENT:
        for pol_stat in CONTENT:
            if pol_stat["Status"] == "OK":
                added += 1
                added_groups.append(pol_stat["GroupName"])
            else:
                no_such_entity += 1
                no_such_entity_groups.append(pol_stat["GroupName"])
        if added_groups:
            note_text = "AWS IAM Integration: Workflow <b>{0}</b>: The
user <b>{1}</b> was removed from the " \
                        "following groups <b>{2}</b> for Resilient
function <b>{3}</b>."\
                .format(WF_NAME, INPUTS["aws_iam_user_name"], ",
".join(str(i) for i in added_groups), FN_NAME)
        if no_such_entity:
            note_text = "AWS IAM Integration: : Workflow <b>{0}</b>: There
were <b>{1}</b> Groups <b>{2}</b> " \
                        "which did not exist for user <b>{3}</b> for
Resilient function <b>{4}</b>."\
                .format(WF_NAME, len(no_such_entity_groups), ",
".join(str(i) for i in no_such_entity_groups),
INPUTS["aws_iam_user_name"], FN_NAME)
    else:
        note_text += "AWS IAM Integration: Workflow <b>{0}</b>: There was
no result returned for Resilient function <b>{0}</b>."\
            .format(WF_NAME, FN_NAME)

    incident.addNote(helper.createRichText(note_text))
if __name__ == "__main__":
    main()
```

Function - AWS IAM: List User Policies

Gets all managed policies and in-line policies that are attached to the specified IAM user. Parameter aws_iam_user_name is an IAM user name.

Example workflows that use this Resilient function include `Example: AWS IAM: Refresh User`, `Example: AWS IAM: Attach User Policy`, `Example: AWS IAM: Get User For Artifact`, `Example: AWS`

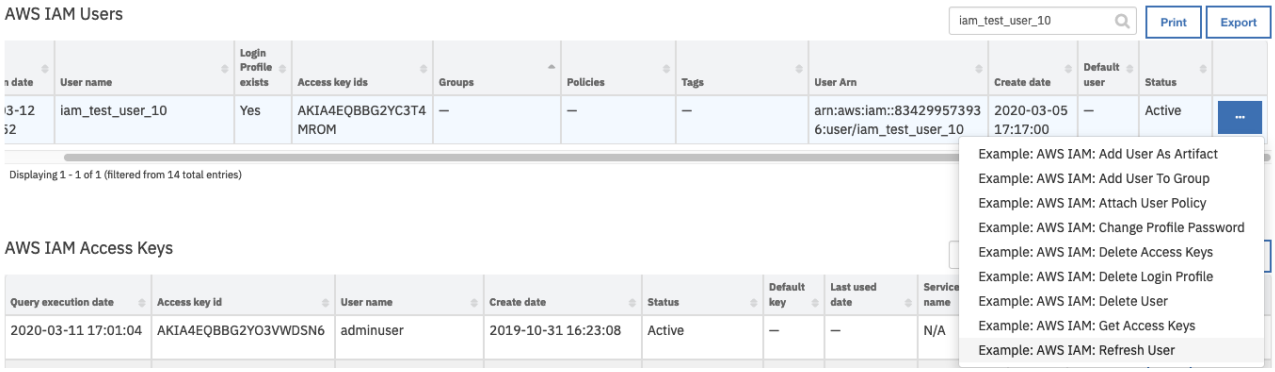
`IAM: Detach All User Policies`, `Example: AWS IAM: Delete User` and `Example: AWS IAM: Delete User For Artifact`.

The workflow, `Example: AWS IAM: Refresh User`, sets the following input fields for the function:

- aws_iam_user_name is mapped to a user name from the selected row of data table `AWS IAM Users`.

The workflow is initiated by the data table rule, `Example: AWS IAM: Refresh User`.

1. Open an incident and select the row of data table `AWS IAM Users` corresponding to the user who needs to have a policy attached.
2. From the selected rows action menu, select `Example: AWS IAM: Refresh User`.



This invokes the `Example: AWS IAM: Refresh User` workflow, which calls the `AWS IAM: List User Policies` function.

On successful completion of the workflow, the `Policies` field of the `AWS IAM Users` data table is updated for the selected user.

▶ Inputs:

Name	Type	Required	Example	Tooltip
`aws_iam_user_name`	`text`	Yes	`AWS IAM user name`	AWS IAM user name.

▶ Outputs:

```
results = {
          'version': '1.0', 'success': True, 'reason': None,
          'content': [{'PolicyName': 'test_pol'},
                      {'PolicyName': 'test_pol_2',
                       'PolicyArn':
'arn:aws:iam::834299573936:policy/test_pol_2'},
                      {'PolicyName': 'AmazonRoute53ReadOnlyAccess',
                       'PolicyArn':
'arn:aws:iam::aws:policy/AmazonRoute53ReadOnlyAccess'}],
```

```
          'raw': '[{"PolicyName": "test_pol"}, {"PolicyName":
"test_pol_2", "PolicyArn":'\
                 '"arn:aws:iam::834299573936:policy/test_pol_2"},
{"PolicyName": '\
                 '"AmazonRoute53ReadOnlyAccess", "PolicyArn":
"arn:aws:iam::aws:policy/AmazonRoute53ReadOnlyAccess"}]',
          'inputs': {'aws_iam_user_name': 'iam_test_User'},
          'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
'package_version': '1.0.0',
                      'host': 'myhost.ibm.com', 'execution_time_ms':
87423, 'timestamp': '2019-11-21 11:55:29'
                     }
}
```

▶ Example Pre-Process Script:

```
inputs.aws_iam_user_name = row.UserName
```

▶ Example Post-Process Script:

```
##  AWS IAM - fn_aws_iam_list_user_policies script ##
#  Globals
# List of fields in datatable fn_aws_iam_list_user_groups script
DATA_TBL_FIELDS = ["Policies"]
FN_NAME = "fn_aws_iam_list_user_policies"
WF_NAME = "Refresh User"
# Processing
CONTENT = results.content
INPUTS = results.inputs
note_text = ''

def main():
    note_text = ''
    if CONTENT:
        policy_names = []
        for pol in CONTENT:
            if  pol["PolicyName"] is not None:
                policy_names.append( pol["PolicyName"])
        row.Policies = ",".join(policy_names)
    else:
        row.Policies = ""

if __name__ == "__main__":
    main()
```

Function - AWS IAM: Attach User policies

Attaches the specified managed policies to the specified IAM user. Parameter aws_iam_user_name is an IAM user name. Parameter aws_iam_policy_names (optional) is a comma-separated list of IAM policy names. Parameter (optional) aws_iam_arns is a comma-separated list of IAM policy arns.

Note: One of parameters, aws_iam_policy_names or aws_iam_arns, is required to be set.

Example workflows that use this Resilient function include `Example: AWS IAM: Attach User Policy`

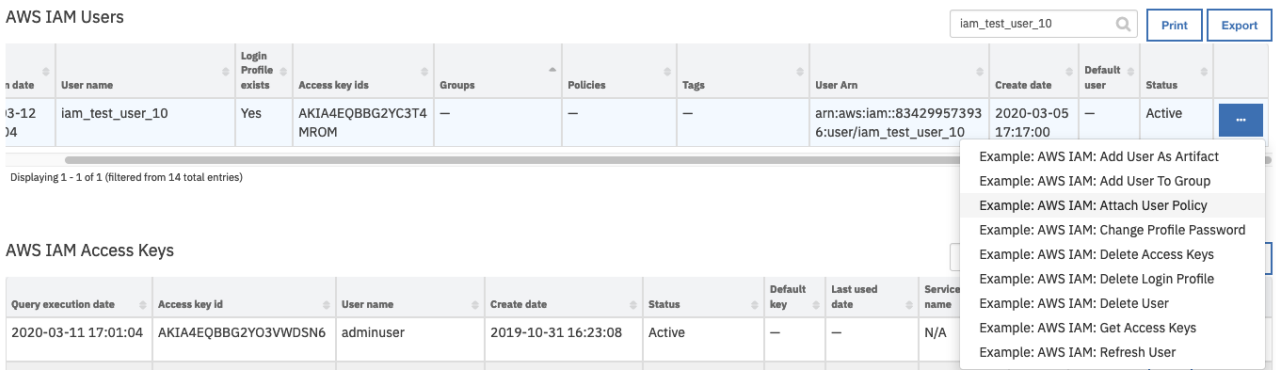
The workflow, `Example: AWS IAM: Attach User Policy`, sets the following input fields for the function:

- aws_iam_user_name is mapped to a user name from the selected row of data table `AWS IAM Users`.
- aws_iam_policy_names is mapped to activity field `aws_iam_policy_name` which should be a drop-down list of policy names.

The workflow is initiated by the data table rule, `Example: AWS IAM: Attach User Policy`.

1. Open an incident and select the row of data table `AWS IAM Users` corresponding to the user who needs to have a policy attached.

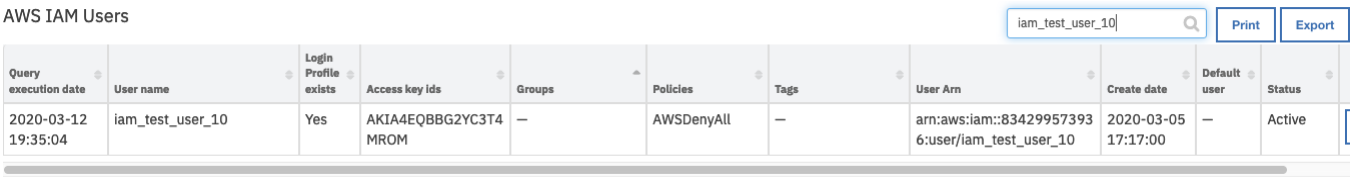
2. From the selected row's actions menu, select `Example: AWS IAM: Attach User Policy`.



3. From the drop-down list of user defined policy names, select a policy and click Execute.

This invokes the `Example: AWS IAM: Attach User Policy` workflow, which calls the `AWS IAM: Attach User policies` function.

On successful completion of the workflow, the `Policies` field of the `AWS IAM Users` data table is updated for the selected user.



▶ Inputs:

Name	Type	Required	Example	Tooltip
aws_iam_arns	text	No	-	Comma-separated list of AWS IAM Amazon Resource Names (ARNs).
aws_iam_policy_names	text	No	-	Comma-separated list of AWS IAM policy names.
aws_iam_user_name	text	Yes	AWS IAM user name	AWS IAM user name.

Note: At least One of the parameters aws_iam_arns or aws_iam_user_name must be set.

▶ Outputs:

```
results = {
          'version': '1.0', 'success': True, 'reason': None,
          'content': [{'PolicyArn': 'arn:aws:iam::aws:policy/AWSDenyAll',
'Status': 'OK'},
                      {'PolicyArn':
'arn:aws:iam::aws:policy/AWSDenyAll_2', 'Status': 'NoSuchEntity'}],
          'raw': '[{"PolicyArn": "arn:aws:iam::aws:policy/AWSDenyAll",
"Status": "OK"}, '\
                 '{"PolicyArn": "arn:aws:iam::aws:policy/AWSDenyAll_2",
"Status": "NoSuchEntity"}]',
          'inputs': {'aws_iam_arns': 'arn:aws:iam::aws:policy/AWSDenyAll',
'aws_iam_user_name': 'iam_test_User_1'},
          'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
'package_version': '1.0.0', 'host': 'myhost.ibm.com',
                      'execution_time_ms': 790, 'timestamp': '2019-11-29
12:18:30'
                     }
}
```

▶ Example Pre-Process Script:

```
inputs.aws_iam_user_name = row.UserName
inputs.aws_iam_policy_names = rule.properties.aws_iam_policy_name
```

▶ Example Post-Process Script:

```
##  AWS IAM - fn_aws_iam_attach_user_policies script ##
#  Globals
# List of fields in datatable for fn_aws_iam_attach_user_policies  script
DATA_TBL_FIELDS = ["Policies"]
FN_NAME = "fn_aws_iam_attach_user_policies"
WF_NAME = "Attach User Policy"
# Processing
```

```
CONTENT = results.content
INPUTS = results.inputs
QUERY_EXECUTION_DATE = results["metrics"]["timestamp"]
note_text = ''

def main():
    note_text = ''
    added = 0
    no_such_entity = 0
    added_policies = []
    no_such_entity_policies = []
    if CONTENT:
        for pol_stat in CONTENT:
            if pol_stat["Status"] == "OK":
                added += 1
                added_policies.append(pol_stat["PolicyName"])
            else:
                no_such_entity += 1
                no_such_entity_policies.append(pol_stat["PolicyName"])
        if added_policies:
            note_text = "AWS IAM Integration: Workflow <b>{0}</b>: The
Policy <b>{1}</b> was attached to user " \
                        "<b>{2}</b> for Resilient function <b>{3}</b>."\
                .format(WF_NAME, ", ".join(str(i) for i in
added_policies), INPUTS["aws_iam_user_name"], FN_NAME)
            note_text += "<br>Refreshing data table <b>{0}</b> row for
user <b>{1}</b> with updated policy data."\
                .format("AWS IAM Users", INPUTS["aws_iam_user_name"])
        if no_such_entity:
            note_text = "AWS IAM Integration: : Workflow <b>{0}</b>: There
were <b>{1}</b> Policies <b>{2}</b> " \
                        "which did not exist for user <b>{3}</b> for
Resilient function <b>{4}</b>."\
                .format(WF_NAME, len(no_such_entity_policies), ",
".join(str(i) for i in no_such_entity_policies),
INPUTS["aws_iam_user_name"], FN_NAME)
    else:
        note_text += "AWS IAM Integration: Workflow <b>{0}</b>: There was
no result returned for Resilient function <b>{0}</b>."\
            .format(WF_NAME, FN_NAME)

    incident.addNote(helper.createRichText(note_text))
if __name__ == "__main__":
    main()
```

Function - AWS IAM: Detach User policies

Removes the specified managed policy from the specified IAM user. Parameter aws_iam_user_name is an IAM user name. Parameter aws_iam_policy_names (optional) is a comma-separated list of IAM policy names. Parameter (optional) aws_iam_arns is a comma-separated list of IAM policy arns.

Note: A user can have embedded inline policies, which the function also deletes. One of the parameters, aws_iam_policy_names or aws_iam_arns, is required to be set.

Example workflows that use this Resilient function include `Example: AWS IAM: Detach All User Policies`, `Example: AWS IAM: Delete User For Artifact` or `Example: AWS IAM: Delete User`.

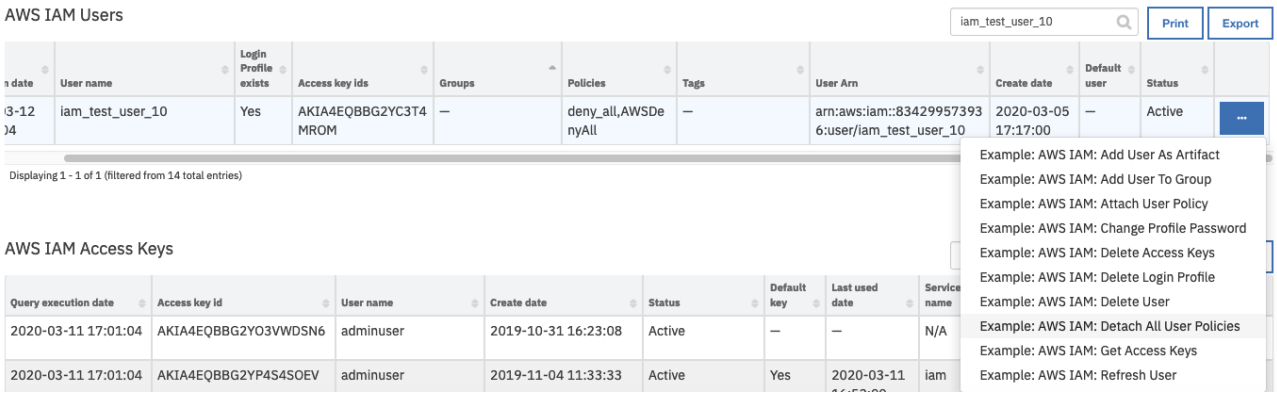
The workflow, `Example: AWS IAM: Detach All User Policies`, sets the following input fields for the function:

- aws_iam_user_name is mapped to a user name from the selected row of data table `AWS IAM Users`.
- aws_iam_policy_names is mapped to all policy names for the user from the selected row of data table `AWS IAM Users`.

The workflow is initiated by the data table rule, `Example: AWS IAM: Detach All User Policies`.

1. Open an incident and select the row of data table `AWS IAM Users` corresponding to the user who needs to have all polices removed or deleted.

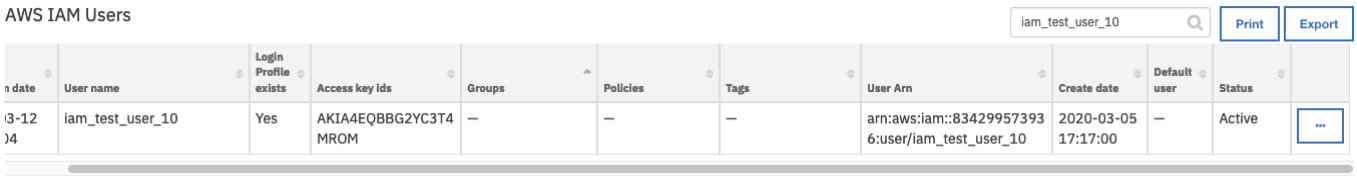
2. From the selected row's actions menu, select `Example: AWS IAM: Detach All User Policies`.



The user is presented with a warning and an option to Execute or Cancel.

3. Press Execute to invoke the `Example: AWS IAM: Detach All User Policies` workflow, which calls the `AWS IAM: Detach User policies` function.

On successful completion of the workflow, the `Policies` field of the `AWS IAM Users` data table is updated to an empty value for the selected user.



▶ Inputs:

Name	Type	Required	Example	Tooltip
aws_iam_arns	text	No	-	Comma-separated list of AWS IAM Amazon Resource Names (ARNs).
aws_iam_policy_names	text	No	-	Comma-separated list of AWS IAM policy names.
aws_iam_user_name	text	Yes	AWS IAM user name	AWS IAM user name.

Note: At least One of the parameters aws_iam_arns or aws_iam_user_name must be set.

▶ Outputs:

```
results = {
          'version': '1.0', 'success': True, 'reason': None,
          'content': [{'PolicyName': 'AWSDenyAll', 'Status': 'OK'},
                      {'PolicyName': 'AWSDenyAll_2', 'Status':
'NoSuchEntity'}],
          'raw': '[{"PolicyName": "AWSDenyAll", "Status": "OK"},
{"PolicyName": "AWSDenyAll_2", "Status": "NoSuchEntity"}]',
          'inputs': {'aws_iam_arns': 'arn:aws:iam::aws:policy/AWSDenyAll',
'aws_iam_user_name': 'iam_test_User_1'},
          'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
'package_version': '1.0.0', 'host': 'myhost.ibm.com',
                      'execution_time_ms': 790, 'timestamp': '2019-11-29
12:18:30'
                     }
}
```

▶ Example Pre-Process Script:

```
inputs.aws_iam_user_name = row.UserName
inputs.aws_iam_policy_names = row.Policies
```

▶ Example Post-Process Script:

```
##  AWS IAM - fn_aws_iam_detach_user_policies script ##
#  Globals
# List of fields in datatable for fn_aws_iam_detach_user_policies  script
DATA_TBL_FIELDS = ["Policies"]
FN_NAME = "fn_aws_iam_detach_user_policies"
WF_NAME = "Detach All User Policies"
# Processing
CONTENT = results.content
INPUTS = results.inputs
QUERY_EXECUTION_DATE = results["metrics"]["timestamp"]
```

```
note_text = ''

def main():
    note_text = ''
    added = 0
    no_such_entity = 0
    detached_policies = []
    no_such_entity_policies = []
    if CONTENT:
        for pol_stat in CONTENT:
            if pol_stat["Status"] == "OK":
                added += 1
                detached_policies.append(pol_stat["PolicyName"])
            else:
                no_such_entity += 1
                no_such_entity_policies.append(pol_stat["PolicyName"])
        if detached_policies:
            note_text = "AWS IAM Integration: Workflow <b>{0}</b>: The
Policies <b>{1}</b> were detached and/or deleted " \
                        "for user <b>{2}</b> for Resilient function <b>{3}
</b>."\
                .format(WF_NAME, ", ".join(str(i) for i in
detached_policies), INPUTS["aws_iam_user_name"], FN_NAME)
        if no_such_entity:
            note_text = "AWS IAM Integration: : Workflow <b>{0}</b>: There
were <b>{1}</b> Policies <b>{2}</b> " \
                        "which did not exist for user <b>{3}</b> for
Resilient function <b>{4}</b>."\
                .format(WF_NAME, len(no_such_entity_policies), ",
".join(str(i) for i in no_such_entity_policies),
INPUTS["aws_iam_user_name"], FN_NAME)
    else:
        note_text += "AWS IAM Integration: Workflow <b>{0}</b>: There was
no result returned for Resilient function <b>{0}</b>."\
            .format(WF_NAME, FN_NAME)

    incident.addNote(helper.createRichText(note_text))
if __name__ == "__main__":
    main()
```

Function - AWS IAM: List SSH Public Keys

List the SSH public keys associated with an IAM user. Parameter aws_iam_user_name is an IAM user name.

Example workflows that use this Resilient function include `Example: AWS IAM: Delete User` or `Example: AWS IAM: Delete User For Artifact`.

The workflow, `Example: AWS IAM: Delete User`, sets the following input field for the function:

- aws_iam_user_name is mapped to a user name from the selected row of data table `AWS IAM Users`.

The workflow is initiated by the data table rule, `Example: AWS IAM: Delete User`. For more information on this workflow, reference section Function - AWS IAM: Delete User

The workflow, `Example: AWS IAM: Delete User For Artifact`, sets the following input field for the function:

- aws_iam_user_name is mapped to an artifact value for artifact of type `AWS IAM User Name`.

The workflow is initiated by the data table rule, `Example: AWS IAM: Delete User For Artifact`. For more information on this workflow, reference section Function - AWS IAM: Delete User

▶ Inputs:

Name	Type	Required	Example	Tooltip
`aws_iam_user_name`	`text`	No	`AWS IAM user name`	AWS IAM user name.

▶ Outputs:

```
results = {
          'version': '1.0', 'success': True, 'reason': None,
          'content': [{'UserName': 'iam_test_user', 'SSHPublicKeyId':
'APKA4EQBBG2YCGOGDY5G',
                       'Status': 'Active', 'UploadDate': '2020-02-25
11:05:17'
                      }
                     ],
          'raw': '[{"UserName": "iam_test_user_10", "SSHPublicKeyId":
"APKA4EQBBG2YCGOGDY5G", '\
                 '"Status": "Active", "UploadDate": "2020-02-25
11:05:17"}]',
          'inputs': {'aws_iam_user_name': 'iam_test_user'},
          'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
'package_version': '1.0.0', 'host': 'myhost.ibm.com',
                      'execution_time_ms': 657, 'timestamp': '2020-02-25
16:11:28'
                     }
}
```

▶ Example Pre-Process Script:

```
inputs.aws_iam_user_name = row.UserName
```

▶ Example Post-Process Script:

```
##  AWS IAM - fn_aws_iam_list_ssh_public_keys script ##
#  Globals
# List of fields in datatable fn_aws_iam_list_ssh_public_keys script
DATA_TBL_FIELDS = ["SSHPublicKeyIds"]
```

```
FN_NAME = "fn_aws_iam_list_ssh_public_keys"
WF_NAME = "Delete User"
# Processing
CONTENT = results.content
INPUTS = results.inputs
DEBUG_SCRIPT=False

def main():
    note_text = ''
    if CONTENT:
        note_text = "AWS IAM Integration: Workflow <b>{0}</b>: There were
<b>{1}</b> 'SSH Public keys' returned for user " \
                    "<b>{2}</b> for Resilient function <b>{3}</b>."\
            .format(WF_NAME, len(CONTENT), INPUTS["aws_iam_user_name"],
FN_NAME)
        access_key_ids = []
        for sshk_id in CONTENT:
            if sshk_id["SSHPublicKeyId"] is not None:
                workflow.addProperty("has_ssh_public_keys", {})
                break
    else:
        note_text = "AWS IAM Integration: Workflow <b>{0}</b>: There was
<b>no</b> 'SSH Public keys' result(s) returned for " \
                    "user <b>{1}</b> for Resilient function <b>{2}</b>."\
            .format(WF_NAME, INPUTS["aws_iam_user_name"], FN_NAME)
    if DEBUG_SCRIPT:
        incident.addNote(helper.createRichText(note_text))

if __name__ == "__main__":
    main()
```

Function - AWS IAM: Delete SSH Public Keys

Delete Secure Shell (SSH) public keys associated with the specified IAM user. Parameter aws_iam_user_name is an IAM user name. Parameter aws_iam_ssh_key_ids is a comma-separated list of SSH public key IDs.

Example workflows that use this Resilient function include `Example: AWS IAM: Delete User` or `Example: AWS IAM: Delete User For Artifact`.

The workflow, `Example: AWS IAM: Delete User`, sets the following input field for the function:

- aws_iam_user_name is mapped to a user name from the selected row of data table `AWS IAM Users`.
- aws_iam_ssh_key_ids is mapped to SSH key IDs retrieved from the previous step (c.f. `AWS IAM: List SSH Public Keys`) in the workflow.

The workflow is initiated by the data table rule, `Example: AWS IAM: Delete User`. For more information on this workflow, reference section Function - AWS IAM: Delete User

The workflow, `Example: AWS IAM: Delete User For Artifact`, sets the following input field for the function:

- aws_iam_user_name is mapped to an artifact value for artifact of type `AWS IAM User Name`.
- aws_iam_ssh_key_ids is mapped to SSH key IDs retrieved from the previous step (c.f. `AWS IAM: List SSH Public Keys`) in the workflow.

The workflow is initiated by the data table rule, `Example: AWS IAM: Delete User For Artifact`. For more information on this workflow, reference section Function - AWS IAM: Delete User

▶ Inputs:

Name	Type	Required	Example	Tooltip
aws_iam_ssh_key_ids	text	No	-	-
aws_iam_user_name	text	No	AWS IAM user name	AWS IAM user name.

▶ Outputs:

```
results = {
          'version': '1.0', 'success': True, 'reason': None,
          'content': [{'SSHPublicKeyId': 'APKA4EQBBG2YCGOGDY5G', 'Status':
'OK'}
                      {'SSHPublicKeyId': 'APKA4EQBBG2YCGOGDY5G', 'Status':
'NoSuchEntity'}],
          'raw': '[{"SSHPublicKeyId": "APKA4EQBBG2YCGOGDY5G", "Status":
"OK"},'\
                 '{"SSHPublicKeyId": "APKA4EQBBG2YCGOGDY5G", "Status":
"NoSuchEntity"}]',
          'inputs': {'aws_iam_ssh_keys_ids': 'APKA4EQBBG2YCGOGDY5G',
'aws_iam_user_name': 'iam_test_User'},
          'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
'package_version': '1.0.0', 'host': 'myhost.ibm.com',
                      'execution_time_ms': 790, 'timestamp': '2019-11-29
12:18:30'
                     }
}
```

▶ Example Pre-Process Script:

```
inputs.aws_iam_user_name = row.UserName
content = workflow.properties.list_ssh_keys_results.content
ssh_key_ids = []
for ssh_key_id in content:
    if ssh_key_id["SSHPublicKeyId"] is not None:
        ssh_key_ids.append(ssh_key_id["SSHPublicKeyId"])
inputs.aws_iam_ssh_key_ids = ",".join(ssh_key_ids)
```

▶ Example Post-Process Script:

```
##  AWS IAM - fn_aws_iam_delete_ssh_keys script ##
#  Globals
# List of fields in datatable for fn_aws_iam_delete_ssh_keys  script
DATA_TBL_FIELDS = ["Policies"]
FN_NAME = "fn_aws_iam_delete_ssh_keys"
WF_NAME = "Delete User"
# Processing
CONTENT = results.content
INPUTS = results.inputs
QUERY_EXECUTION_DATE = results["metrics"]["timestamp"]
DEBUG_SCRIPT = False

def main():
    note_text = ''
    deleted = 0
    no_such_entity = 0
    deleted_keys = []
    no_such_entity_keys = []
    if CONTENT:
        for grp_stat in CONTENT:
            if grp_stat["Status"] == "OK":
                deleted += 1
                deleted_keys.append(grp_stat["GroupName"])
            else:
                no_such_entity += 1
                no_such_entity_keys.append(grp_stat["GroupName"])
        if deleted_keys:
            note_text = "AWS IAM Integration: Workflow <b>{0}</b>: There
were <b>{1}</b> 'SSH Public keys' <b>{2}</b> removed " \
                        "for user <b>{3}</b> for Resilient function <b>{4}
</b>."\
                .format(WF_NAME, len(deleted_keys), ", ".join(str(i) for i
in deleted_keys), INPUTS["aws_iam_user_name"], FN_NAME)
        if no_such_entity:
            note_text = "AWS IAM Integration: : Workflow <b>{0}</b>: There
were <b>{1}</b> 'SSH Public keys' <b>{2}</b> " \
                        "which did not exist for user <b>{3}</b> for
Resilient function <b>{4}</b>."\
                .format(WF_NAME, len(no_such_entity_keys), ",
".join(str(i) for i in no_such_entity_keys), INPUTS["aws_iam_user_name"],
FN_NAME)
    else:
        note_text += "AWS IAM Integration: Workflow <b>{0}</b>: There was
no result returned for Resilient function <b>{0}</b>."\
            .format(WF_NAME, FN_NAME)
    if DEBUG_SCRIPT:
        incident.addNote(helper.createRichText(note_text))
if __name__ == "__main__":
    main()
```

Function - AWS IAM: List Service Specific Credentials

List the service-specific credentials associated with an IAM user. Parameter aws_iam_user_name is an IAM user name.

Example workflows that use this Resilient function include `Example: AWS IAM: Delete User` or `Example: AWS IAM: Delete User For Artifact`.

The workflow, `Example: AWS IAM: Delete User`, sets the following input field for the function:

- aws_iam_user_name is mapped to a user name from the selected row of data table `AWS IAM Users`.

The workflow is initiated by the data table rule, `Example: AWS IAM: Delete User`. For more information on this workflow, reference section Function - AWS IAM: Delete User

The workflow, `Example: AWS IAM: Delete User For Artifact`, sets the following input field for the function:

- aws_iam_user_name is mapped to an artifact value for artifact of type `AWS IAM User Name`.

The workflow is initiated by the data table rule, `Example: AWS IAM: Delete User For Artifact`. For more information on this workflow, reference section Function - AWS IAM: Delete User

▶ Inputs:

Name	Type	Required	Example	Tooltip
aws_iam_user_name	text	No	AWS IAM user name	AWS IAM user name.

▶ Outputs:

```
results = {'version': '1.0', 'success': True, 'reason': None,
        'content': [{'UserName': 'iam_test_user', 'Status': 'Active',
'ServiceUserName': 'iam_test_user-at-834299573936',
                     'CreateDate': '2020-02-25 10:43:24',
'ServiceSpecificCredentialId': 'ACCA4EQBBG2YH6NR76SCQ',
                     'ServiceName': 'codecommit.amazonaws.com'
                    },
                    {'UserName': 'iam_test_user', 'Status': 'Active',
'ServiceUserName': 'iam_test_user_10-at-834299573936',
                     'CreateDate': '2020-02-26 11:50:52',
'ServiceSpecificCredentialId': 'ACCA4EQBBG2YGOLHZWY7L',
                     'ServiceName': 'cassandra.amazonaws.com'}],
        'raw': '[{"UserName": "iam_test_user", "Status": "Active",
"ServiceUserName": "iam_test_user_10-at-834299573936",'\
                  '"CreateDate": "2020-02-25 10:43:24",
"ServiceSpecificCredentialId": "ACCA4EQBBG2YH6NR76SCQ", '\
                  '"ServiceName": "codecommit.amazonaws.com"},
{"UserName": "iam_test_user_10", "Status": "Active", '\
                  '"ServiceUserName": "iam_test_user_10-at-834299573936",
"CreateDate": "2020-02-26 11:50:52", '\
                  '"ServiceSpecificCredentialId":
"ACCA4EQBBG2YGOLHZWY7L", "ServiceName": "cassandra.amazonaws.com"}]',
        'inputs': {'aws_iam_user_name': 'iam_test_user'},
        'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
```

```
'package_version': '1.0.0', 'host': 'myhost.ibm.com',
                     'execution_time_ms': 982, 'timestamp': '2020-02-26
11:56:51'
                    }
}
```

▶ Example Pre-Process Script:

```
inputs.aws_iam_user_name = row.UserName
```

▶ Example Post-Process Script:

```
  ##  AWS IAM - fn_aws_iam_list_service_specific_credentials script ##
#  Globals
# List of fields in datatable fn_aws_iam_list_service_specific_credentials
script
DATA_TBL_FIELDS = ["ServiceSpecificCredentialIds"]
FN_NAME = "fn_aws_iam_list_service_specific_credentials"
WF_NAME = "Delete User"
# Processing
CONTENT = results.content
INPUTS = results.inputs
DEBUG_SCRIPT = False

def main():
    note_text = ''
    if CONTENT:
        note_text = "AWS IAM Integration: Workflow <b>{0}</b>: There were
<b>{1}</b> 'Service specific credentials' returned for user " \
                    "<b>{2}</b> for Resilient function <b>{3}</b>."\
            .format(WF_NAME, len(CONTENT), INPUTS["aws_iam_user_name"],
FN_NAME)
        for ssc_id in CONTENT:
            if ssc_id["ServiceSpecificCredentialId"] is not None:
                workflow.addProperty("has_srv_creds", {})
                break
    else:
        note_text = "AWS IAM Integration: Workflow <b>{0}</b>: There was
<b>no</b> 'Service specific credentials' result(s) returned for " \
                    "user <b>{1}</b> for Resilient function <b>{2}</b>."\
            .format(WF_NAME, INPUTS["aws_iam_user_name"], FN_NAME)
    if DEBUG_SCRIPT:
        incident.addNote(helper.createRichText(note_text))

if __name__ == "__main__":
    main()
```

Function - AWS IAM: Delete Service Specific Credentials

Delete service-specific credentials associated with the specified IAM user. Parameter aws_iam_user_name is an IAM user name. Parameter aws_iam_ssc_ids is a comma-separated list of service-specific credential ids.

Example workflows that use this Resilient function include `Example: AWS IAM: Delete User` or `Example: AWS IAM: Delete User For Artifact`.

The workflow, `Example: AWS IAM: Delete User`, sets the following input field for the function:

- aws_iam_user_name is mapped to a user name from the selected row of data table `AWS IAM Users`.
- aws_iam_ssc_ids is mapped to service specific credential IDs retrieved from the previous step (c.f. `AWS IAM: List Service Specific Credentials`) in the workflow.

The workflow is initiated by the data table rule, `Example: AWS IAM: Delete User`. For more information on this workflow reference section Function - AWS IAM: Delete User

The workflow, `Example: AWS IAM: Delete User For Artifact`, sets the following input field for the function:

- aws_iam_user_name is mapped to an artifact value for artifact of type `AWS IAM User Name`.
- aws_iam_ssc_ids is mapped to service specific credential IDs retrieved from the previous step (c.f. `AWS IAM: List Service Specific Credentials`) in the workflow.

The workflow is initiated by the data table rule, `Example: AWS IAM: Delete User For Artifact`. For more information on this workflow reference section Function - AWS IAM: Delete User

▶ Inputs:

Name	Type	Required	Example	Tooltip
`aws_iam_ssc_ids`	`text`	No	`-`	-
`aws_iam_user_name`	`text`	No	`AWS IAM user name`	AWS IAM user name.

▶ Outputs:

```
results = {
          'version': '1.0', 'success': True, 'reason': None,
          'content': [{'ServiceSpecificCredentialId':
'ACCA4EQBBG2YH6NR76SCQ', 'Status': 'OK'}
                      {'ServiceSpecificCredentialId':
'ACCA4EQBBG2YH6NR76SCQ', 'Status': 'NoSuchEntity'}],
          'raw': '[{"ServiceSpecificCredentialId: "ACCA4EQBBG2YH6NR76SCQ",
"Status": "OK"},'\
                 '{"ServiceSpecificCredentialId": "ACCA4EQBBG2YH6NR76SCQ",
"Status": "NoSuchEntity"}]',
          'inputs': {'aws_iam_ssc_ids': 'ACCA4EQBBG2YH6NR76SCQ',
'aws_iam_user_name': 'iam_test_User'},
          'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
'package_version': '1.0.0', 'host': 'myhost.ibm.com',
                      'execution_time_ms': 790, 'timestamp': '2019-11-29
12:18:30'
```

```
                    }
}
```

▶ Example Pre-Process Script:

```
  inputs.aws_iam_user_name = row.UserName
content = workflow.properties.list_srv_specific_creds_results.content
srv_specific_cred_ids = []
for ssc_id in content:
    if ssc_id["ServiceSpecificCredentialId"] is not None:

srv_specific_cred_ids.append(ssc_id["ServiceSpecificCredentialId"])
inputs.aws_iam_ssc_ids = ",".join(srv_specific_cred_ids)
```

▶ Example Post-Process Script:

```
##  AWS IAM - fn_aws_iam_delete_ss_creds script ##
#  Globals
# List of fields in datatable for fn_aws_iam_delete_ss_creds  script
DATA_TBL_FIELDS = ["Policies"]
FN_NAME = "fn_aws_iam_delete_ss_creds"
WF_NAME = "Delete User"
# Processing
CONTENT = results.content
INPUTS = results.inputs
QUERY_EXECUTION_DATE = results["metrics"]["timestamp"]
DEBUG_SCRIPT = False

def main():
    note_text = ''
    deleted = 0
    no_such_entity = 0
    deleted_creds = []
    no_such_entity_creds = []
    if CONTENT:
        for grp_stat in CONTENT:
            if grp_stat["Status"] == "OK":
                deleted += 1
                deleted_creds.append(grp_stat["GroupName"])
            else:
                no_such_entity += 1
                no_such_entity_creds.append(grp_stat["GroupName"])
        if deleted_creds:
            note_text = "AWS IAM Integration: Workflow <b>{0}</b>: There
were <b>{1}</b> 'Service specific credentials' <b>{2}</b> removed " \
                        "for user <b>{3}</b> for Resilient function <b>{4}
</b>."\
                .format(WF_NAME, len(deleted_creds), ", ".join(str(i) for
i in deleted_creds), INPUTS["aws_iam_user_name"], FN_NAME)
```

```
        if no_such_entity:
            note_text = "AWS IAM Integration: : Workflow <b>{0}</b>: There
were <b>{1}</b> 'Service specific credentials' <b>{2}</b> " \
                        "which did not exist for user <b>{3}</b> for
Resilient function <b>{4}</b>."\
                .format(WF_NAME, len(no_such_entity_creds), ",
".join(str(i) for i in no_such_entity_creds), INPUTS["aws_iam_user_name"],
FN_NAME)
    else:
        note_text += "AWS IAM Integration: Workflow <b>{0}</b>: There was
no result returned for Resilient function <b>{0}</b>."\
            .format(WF_NAME, FN_NAME)
    if DEBUG_SCRIPT:
        incident.addNote(helper.createRichText(note_text))
if __name__ == "__main__":
    main()
```

Function - AWS IAM: List Signing Certificates

List the signing certificates associated with an IAM user. Parameter aws_iam_user_name is an IAM user name.

Example workflows that use this Resilient function include `Example: AWS IAM: Delete User` or `Example: AWS IAM: Delete User For Artifact`.

The workflow, `Example: AWS IAM: Delete User`, sets the following input field for the function:

- aws_iam_user_name is mapped to a user name from the selected row of data table `AWS IAM Users`.

The workflow is initiated by the data table rule, `Example: AWS IAM: Delete User`. For more information on this workflow reference section Function - AWS IAM: Delete User

The workflow, `Example: AWS IAM: Delete User For Artifact`, sets the following input field for the function:

- aws_iam_user_name is mapped to an artifact value for artifact of type `AWS IAM User Name`.

The workflow is initiated by the data table rule, `Example: AWS IAM: Delete User For Artifact`. For more information on this workflow reference section Function - AWS IAM: Delete User

▶ Inputs:

Name	Type	Required	Example	Tooltip
`aws_iam_user_name`	`text`	No	`AWS IAM user name`	AWS IAM user name.

▶ Outputs:

```
results = {'version': '1.0', 'success': True, 'reason': None,
         'content': [{'UserName': 'iam_test_user', 'CertificateId':
'WM6U3NNR5JH3AOTNJY44CUI6I6EYXTLD',
```

```
                      'CertificateBody': '-----BEGIN CERTIFICATE-----
\nMIID...Apg=\n-----END CERTIFICATE-----',
                      'Status': 'Active', 'UploadDate': '2020-02-26
12:25:27'}],
         'raw': '[{"UserName": "iam_test_user", "CertificateId":
"WM6U3NNR5JH3AOTNJY44CUI6I6EYXTLD", "CertificateBody":'
                '"-----BEGIN CERTIFICATE-----\\nMIID...Apg=\\n-----END
CERTIFICATE-----", "Status": "Active",'
                '"UploadDate": "2020-02-26 12:25:27"}]',
         'inputs': {'aws_iam_user_name': 'iam_test_user'},
         'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
'package_version': '1.0.0', 'host': 'myhost.ibm.com',
                     'execution_time_ms': 729, 'timestamp': '2020-02-26
12:33:57'
                    }
}
```

▶ Example Pre-Process Script:

```
inputs.aws_iam_user_name = row.UserName
```

▶ Example Post-Process Script:

```
  ##  AWS IAM - fn_aws_iam_list_signing_certificates script ##
# Example result:
"""
Result: {'version': '1.0', 'success': True, 'reason': None,
         'content': [{'UserName': 'iam_test_user', 'CertificateId':
'WM6U3NNR5JH3AOTNJY44CUI6I6EYXTLD',
                      'CertificateBody': '-----BEGIN CERTIFICATE-----
\nMIID...Apg=\n-----END CERTIFICATE-----',
                      'Status': 'Active', 'UploadDate': '2020-02-26
12:25:27'}],
         'raw': '[{"UserName": "iam_test_user", "CertificateId":
"WM6U3NNR5JH3AOTNJY44CUI6I6EYXTLD", "CertificateBody":
                "-----BEGIN CERTIFICATE-----\\nMIID...Apg=\\n-----END
CERTIFICATE-----", "Status": "Active", "UploadDate": "2020-02-26
12:25:27"}]',
         'inputs': {'aws_iam_user_name': 'iam_test_user'},
         'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
'package_version': '1.0.0', 'host': 'myhost.ibm.com',
                     'execution_time_ms': 729, 'timestamp': '2020-02-26
12:33:57'
        }
}
"""
#  Globals
# List of fields in datatable fn_aws_iam_list_signing_certificates script
DATA_TBL_FIELDS = ["CertificateIds"]
```

```
FN_NAME = "fn_aws_iam_list_signing_certificates"
WF_NAME = "Delete User"
# Processing
CONTENT = results.content
INPUTS = results.inputs
DEBUG_SCRIPT=False

def main():
    note_text = ''
    if CONTENT:
        note_text = "AWS IAM Integration: Workflow <b>{0}</b>: There were
<b>{1}</b> 'Signing Certificates' returned for user " \
                    "<b>{2}</b> for Resilient function <b>{3}</b>."\
            .format(WF_NAME, len(CONTENT), INPUTS["aws_iam_user_name"],
FN_NAME)
        for scert_id in CONTENT:
            if scert_id["CertificateId"] is not None:
                workflow.addProperty("has_sign_certs", {})
                break
    else:
        note_text = "AWS IAM Integration: Workflow <b>{0}</b>: There was
<b>no</b> 'Signing Certificates' result(s) returned for " \
                    "user <b>{1}</b> for Resilient function <b>{2}</b>."\
            .format(WF_NAME, INPUTS["aws_iam_user_name"], FN_NAME)
    if DEBUG_SCRIPT:
        incident.addNote(helper.createRichText(note_text))

if __name__ == "__main__":
    main()
```

Function - AWS IAM: Delete Signing Certificates

Delete signing certificates associated with the specified IAM user. Parameter aws_iam_user_name is an IAM user name. Parameter aws_iam_sign_cert_ids is a comma-separated list of signing certificate ids.

Example workflows that use this Resilient function include `Example: AWS IAM: Delete User` or `Example: AWS IAM: Delete User For Artifact`.

The workflow, `Example: AWS IAM: Delete User`, sets the following input field for the function:

- aws_iam_user_name is mapped to a user name from the selected row of data table `AWS IAM Users`.
- aws_iam_sign_cert_ids is mapped to signing certificate IDs retrieved from the previous step (c.f. `AWS IAM: List Signing Certificates`) in the workflow.

The workflow is initiated by the data table rule, `Example: AWS IAM: Delete User`. For more information on this workflow, reference section Function - AWS IAM: Delete User

The workflow, `Example: AWS IAM: Delete User For Artifact`, sets the following input field for the function:

- aws_iam_user_name is mapped to an artifact value for artifact of type `AWS IAM User Name`.

- aws_iam_sign_cert_ids is mapped to signing certificate IDs retrieved from the previous step (c.f. `AWS IAM: List Signing Certificates`) in the workflow.

The workflow is initiated by the data table rule, `Example: AWS IAM: Delete User For Artifact`. For more information on this workflow, reference section Function - AWS IAM: Delete User

▶ Inputs:

Name	Type	Required	Example	Tooltip
aws_iam_sign_cert_ids	text	No	-	-
aws_iam_user_name	text	No	AWS IAM user name	AWS IAM user name.

▶ Outputs:

```
results = {
          'version': '1.0', 'success': True, 'reason': None,
          'content': [{'CertificateId':
'WM6U3NNR5JH3AOTNJY44CUI6I6EYXTLD', 'Status': 'OK'},
                      {'CertificateId':
'WM6U3NNR5JH3AOTNJY44CUI6I6EYXTLD', 'Status': 'NoSuchEntity'}],
          'raw': '[{'CertificateId': "WM6U3NNR5JH3AOTNJY44CUI6I6EYXTLD",
"Status": "OK"},'
                 '{'CertificateId': 'WM6U3NNR5JH3AOTNJY44CUI6I6EYXTLD',
'Status': 'NoSuchEntity'}]',
          'inputs': {'aws_iam_sign_cert_ids':
'WM6U3NNR5JH3AOTNJY44CUI6I6EYXTLD', 'aws_iam_user_name': 'iam_test_User'},
          'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
'package_version': '1.0.0', 'host': 'myhost.ibm.com',
                      'execution_time_ms': 790, 'timestamp': '2019-11-29
12:18:30'
                    }
}
```

▶ Example Pre-Process Script:

```
inputs.aws_iam_user_name = row.UserName
content = workflow.properties.list_signing_certs_results.content
sign_cert_ids = []
for scert_id in content:
    if scert_id["CertificateId"] is not None:
        sign_cert_ids.append(scert_id["CertificateId"])
inputs.aws_iam_sign_cert_ids = ",".join(sign_cert_ids)
```

▶ Example Post-Process Script:

```
##  AWS IAM - fn_aws_iam_list_signing_certs script ##
```

```
#  Globals
# List of fields in datatable for fn_aws_iam_list_signing_certs  script
DATA_TBL_FIELDS = ["Policies"]
FN_NAME = "fn_aws_iam_list_signing_certs"
WF_NAME = "Delete User"
# Processing
CONTENT = results.content
INPUTS = results.inputs
QUERY_EXECUTION_DATE = results["metrics"]["timestamp"]
DEBUG_SCRIPT = False

def main():
    note_text = ''
    deleted = 0
    no_such_entity = 0
    deleted_certs = []
    no_such_entity_certs = []
    if CONTENT:
        for grp_stat in CONTENT:
            if grp_stat["Status"] == "OK":
                deleted += 1
                deleted_certs.append(grp_stat["GroupName"])
            else:
                no_such_entity += 1
                no_such_entity_certs.append(grp_stat["GroupName"])
        if deleted_certs:
            note_text = "AWS IAM Integration: Workflow <b>{0}</b>: There
were <b>{1}</b> 'Signing Certificates' <b>{2}</b> removed " \
                        "for user <b>{3}</b> for Resilient function <b>{4}
</b>."\
                .format(WF_NAME, len(deleted_certs), ", ".join(str(i) for
i in deleted_certs), INPUTS["aws_iam_user_name"], FN_NAME)
        if no_such_entity:
            note_text = "AWS IAM Integration: Workflow <b>{0}</b>: There
were <b>{1}</b> 'Signing Certificates' <b>{2}</b> " \
                        "which did not exist for user <b>{3}</b> for
Resilient function <b>{4}</b>."\
                .format(WF_NAME, len(no_such_entity_certs), ",
".join(str(i) for i in no_such_entity_certs), INPUTS["aws_iam_user_name"],
FN_NAME)
    else:
        note_text += "AWS IAM Integration: Workflow <b>{0}</b>: There was
no result returned for Resilient function <b>{0}</b>."\
            .format(WF_NAME, FN_NAME)
    if DEBUG_SCRIPT:
        incident.addNote(helper.createRichText(note_text))
if __name__ == "__main__":
    main()
```

Function - AWS IAM: List MFA Devices

List the MFA devices associated with an IAM user. Also determine which of the associated MFA devices is a virtual device. Parameter aws_iam_user_name is an IAM user name.

Example workflows that use this Resilient function include `Example: AWS IAM: Delete User` or `Example: AWS IAM: Delete User For Artifact`.

The workflow, `Example: AWS IAM: Delete User`, sets the following input field for the function:

- aws_iam_user_name is mapped to a user name from the selected row of data table `AWS IAM Users`.

The workflow is initiated by the data table rule, `Example: AWS IAM: Delete User`. For more information on this workflow, reference section Function - AWS IAM: Delete User

The workflow, `Example: AWS IAM: Delete User For Artifact`, sets the following input field for the function:

- aws_iam_user_name is mapped to an artifact value for artifact of type `AWS IAM User Name`.

The workflow is initiated by the data table rule, `Example: AWS IAM: Delete User For Artifact`. For more information on this workflow, reference section Function - AWS IAM: Delete User

▶ Inputs:

Name	Type	Required	Example	Tooltip
aws_iam_user_name	text	No	AWS IAM user name	AWS IAM user name.

▶ Outputs:


```
results = {'version': '1.0', 'success': True, 'reason': None,
        'content': [{'UserName': 'iam_test_user', 'SerialNumber':
'arn:aws:iam::834299573936:mfa/iam_test_user',
                     'EnableDate': '2020-02-26 16:55:05', 'is_virtual':
True}],
        'raw': '[{"UserName": "iam_test_user_10", "SerialNumber":
"arn:aws:iam::834299573936:mfa/iam_test_user_10",'
               '"EnableDate": "2020-02-26 16:55:05", 'is_virtual':
True}]',
        'inputs': {'aws_iam_user_name': 'iam_test_user_10'},
        'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
'package_version': '1.0.0', 'host': 'myhost.ie.ibm.com',
                    'execution_time_ms': 5644, 'timestamp': '2020-02-26
17:37:48'
                   }
}
```


▶ Example Pre-Process Script:

```
inputs.aws_iam_user_name = row.UserName
```

▶ Example Post-Process Script:

```
##  AWS IAM - fn_aws_iam_list_mfa_devices script ##
#  Globals
# List of fields in datatable fn_aws_iam_list_mfa_devices script
DATA_TBL_FIELDS = ["SerialNumbers"]
FN_NAME = "fn_aws_iam_list_mfa_devices"
WF_NAME = "Delete User"
# Processing
CONTENT = results.content
INPUTS = results.inputs
DEBUG_SCRIPT=False

def main():
    note_text = ''
    if CONTENT:
        note_text = "AWS IAM Integration: Workflow <b>{0}</b>: There were
<b>{1}</b> 'Active NFA devices' returned for user " \
                    "<b>{2}</b> for Resilient function <b>{3}</b>."\
            .format(WF_NAME, len(CONTENT), INPUTS["aws_iam_user_name"],
FN_NAME)
        for mfa_ser_num in CONTENT:
            if mfa_ser_num["SerialNumber"] is not None:
                workflow.addProperty("has_active_mfa", {})
            if mfa_ser_num.get("is_virtual", None):
                workflow.addProperty("is_virtual_mfa", {})
    else:
        note_text = "AWS IAM Integration: Workflow <b>{0}</b>: There was
<b>no</b> 'Active NFA devices' result(s) returned for " \
                    "user <b>{1}</b> for Resilient function <b>{2}</b>."\
            .format(WF_NAME, INPUTS["aws_iam_user_name"], FN_NAME)
    if DEBUG_SCRIPT:
        incident.addNote(helper.createRichText(note_text))

if __name__ == "__main__":
    main()
```

Function - AWS IAM: Deactivate MFA Devices

Deactivate MFA devices and remove it from association with the user name for which it was originally enabled. Parameter aws_iam_user_name is an IAM user name. Parameter aws_iam_mfa_serial_numbers is a comma-separated list of IAM MFA serial numbers or arns.

Example workflows that use this Resilient function include `Example: AWS IAM: Delete User` or `Example: AWS IAM: Delete User For Artifact`.

The workflow, `Example: AWS IAM: Delete User`, sets the following input field for the function:

- aws_iam_user_name is mapped to a user name from the selected row of data table `AWS IAM Users`.

- aws_iam_mfa_serial_numbers is mapped to MFA serial numbers retrieved from the previous step (c.f. `AWS IAM: List MFA Devices`) in the workflow.

The workflow is initiated by the data table rule, `Example: AWS IAM: Delete User`. For more information on this workflow, reference section Function - AWS IAM: Delete User

The workflow, `Example: AWS IAM: Delete User For Artifact`, sets the following input field for the function:

- aws_iam_user_name is mapped to an artifact value for artifact of type `AWS IAM User Name`.
- aws_iam_mfa_serial_numbers is mapped to MFA serial numbers retrieved from the previous step (c.f. `AWS IAM: List MFA Devices`) in the workflow.

The workflow is initiated by the data table rule, `Example: AWS IAM: Delete User For Artifact`. For more information on this workflow, reference section Function - AWS IAM: Delete User

▶ Inputs:

Name	Type	Required	Example	Tooltip
aws_iam_mfa_serial_nums	text	No	–	-
aws_iam_user_name	text	No	AWS IAM user name	AWS IAM user name.

▶ Outputs:

```
results = {
          'version': '1.0', 'success': True, 'reason': None,
          'content': [{'SerialNumber':
'arn:aws:iam::834299573936:mfa/iam_test_user', 'Status': 'OK'}],
          'raw': '[{"SerialNumber":
"arn:aws:iam::834299573936:mfa/iam_test_user", "Status": "OK"}]',
          'inputs': {'aws_iam_mfa_serial_nums':
'arn:aws:iam::834299573936:mfa/iam_test_user',
                     'aws_iam_user_name': 'iam_test_User'},
          'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
'package_version': '1.0.0', 'host': 'myhost.ibm.com',
                      'execution_time_ms': 790, 'timestamp': '2019-11-29
12:18:30'
                     }
}
```

▶ Example Pre-Process Script:

```
inputs.aws_iam_user_name = row.UserName
content = workflow.properties.list_mfa_devices_results.content
mfa_serial_nums = []
for mfa_ser_num in content:
    if mfa_ser_num["SerialNumber"] is not None:
        mfa_serial_nums.append(mfa_ser_num["SerialNumber"])
inputs.aws_iam_mfa_serial_nums = ",".join(mfa_serial_nums)
```

▶ Example Post-Process Script:

```
  ##  AWS IAM - fn_aws_iam_deactivate_mfa_devices script ##
#  Globals
# List of fields in datatable for fn_aws_iam_deactivate_mfa_devices
script
DATA_TBL_FIELDS = ["Policies"]
FN_NAME = "fn_aws_iam_deactivate_mfa_devices"
WF_NAME = "Delete User"
# Processing
CONTENT = results.content
INPUTS = results.inputs
QUERY_EXECUTION_DATE = results["metrics"]["timestamp"]
DEBUG_SCRIPT = False

def main():
    note_text = ''
    deactivated = 0
    no_such_entity = 0
    deactivated_mfas = []
    no_such_entity_mfas = []
    if CONTENT:
        for grp_stat in CONTENT:
            if grp_stat["Status"] == "OK":
                deactivated += 1
                deactivated_mfas.append(grp_stat["GroupName"])
            else:
                no_such_entity += 1
                no_such_entity_mfas.append(grp_stat["GroupName"])
        if deactivated_mfas:
            note_text = "AWS IAM Integration: Workflow <b>{0}</b>: There
were <b>{1}</b> 'MFA devices' <b>{2}</b> de-activated " \
                        "for user <b>{3}</b> for Resilient function <b>{4}
</b>."\
                .format(WF_NAME, len(deactivated_mfas), ", ".join(str(i)
for i in deactivated_mfas), INPUTS["aws_iam_user_name"], FN_NAME)
        if no_such_entity:
            note_text = "AWS IAM Integration: : Workflow <b>{0}</b>: There
were <b>{1}</b> 'MFA devices' <b>{2}</b> " \
                        "which did not exist for user <b>{3}</b> for
Resilient function <b>{4}</b>."\
                .format(WF_NAME, len(no_such_entity_mfas), ",
".join(str(i) for i in no_such_entity_mfas), INPUTS["aws_iam_user_name"],
FN_NAME)
    else:
        note_text += "AWS IAM Integration: Workflow <b>{0}</b>: There was
no result returned for Resilient function <b>{0}</b>."\
            .format(WF_NAME, FN_NAME)
    if DEBUG_SCRIPT:
        incident.addNote(helper.createRichText(note_text))
```

```
if __name__ == "__main__":
    main()
```

Function - AWS IAM: Delete Virtual MFA Devices

Delete a virtual MFA device. Parameter aws_iam_mfa_serial_numbers is a comma-separated list of IAM MFA serial numbers or arns.

Note: You must deactivate a user's virtual MFA device before you can delete it.

Example workflows that use this Resilient function include `Example: AWS IAM: Delete User` or `Example: AWS IAM: Delete User For Artifact`.

The workflow, `Example: AWS IAM: Delete User`, sets the following input field for the function:

- aws_iam_mfa_serial_numbers is mapped to MFA serial numbers retrieved a previous step (c.f. `AWS IAM: List MFA Devices`) in the workflow.

The workflow is initiated by the data table rule, `Example: AWS IAM: Delete User`. For more information on this workflow, reference section Function - AWS IAM: Delete User

The workflow, `Example: AWS IAM: Delete User For Artifact`, sets the following input field for the function:

- aws_iam_mfa_serial_numbers is mapped to MFA serial numbers retrieved a previous step (c.f. `AWS IAM: List MFA Devices`) in the workflow.

The workflow is initiated by the data table rule, `Example: AWS IAM: Delete User For Artifact`. For more information on this workflow, reference section Function - AWS IAM: Delete User

▶ Inputs:

Name	Type	Required	Example	Tooltip
`aws_iam_mfa_serial_nums`	`text`	No	`-`	-

▶ Outputs:

```
results = {
          'version': '1.0', 'success': True, 'reason': None,
          'content': [{'SerialNumber':
'arn:aws:iam::834299573936:mfa/iam_test_user', 'Status': 'OK'}],
          'raw': '[{'SerialNumber':
"arn:aws:iam::834299573936:mfa/iam_test_user", "Status": "OK"}]',
          'inputs': {'aws_iam_mfa_serial_nums':
'arn:aws:iam::834299573936:mfa/iam_test_user',
                     'aws_iam_user_name': 'iam_test_User'},
          'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
'package_version': '1.0.0', 'host': 'myhost.ibm.com',
                      'execution_time_ms': 790, 'timestamp': '2019-11-29
12:18:30'
```

```
                    }
}
```

▶ Example Pre-Process Script:

```
content = workflow.properties.list_mfa_devices_results.content
mfa_serial_nums = []
for mfa_ser_num in content:
    if mfa_ser_num["SerialNumber"] is not None and
mfa_ser_num.get("is_virtual", None):
        mfa_serial_nums.append(mfa_ser_num["SerialNumber"])
inputs.aws_iam_mfa_serial_nums = ",".join(mfa_serial_nums)
```

▶ Example Post-Process Script:

```
##  AWS IAM - fn_aws_iam_delete_mfa_devices script ##
# Example result:

#  Globals
# List of fields in datatable for fn_aws_iam_delete_mfa_devices  script
DATA_TBL_FIELDS = ["Policies"]
FN_NAME = "fn_aws_iam_delete_mfa_devices"
WF_NAME = "Delete User"
# Processing
CONTENT = results.content
INPUTS = results.inputs
QUERY_EXECUTION_DATE = results["metrics"]["timestamp"]
DEBUG_SCRIPT = False

def main():
    note_text = ''
    deleted = 0
    no_such_entity = 0
    deleted_mfas = []
    no_such_entity_mfas = []
    if CONTENT:
        for grp_stat in CONTENT:
            if grp_stat["Status"] == "OK":
                deleted += 1
                deleted_mfas.append(grp_stat["GroupName"])
            else:
                no_such_entity += 1
                no_such_entity_mfas.append(grp_stat["GroupName"])
        if deleted_mfas:
            note_text = "AWS IAM Integration: Workflow <b>{0}</b>: There
were <b>{1}</b> 'MFA devices' <b>{2}</b> deleted" \
                        "for user <b>{3}</b> for Resilient function <b>{4}
</b>."\
                .format(WF_NAME, len(deleted_mfas), ", ".join(str(i) for i
```

```
in deleted_mfas), INPUTS["aws_iam_user_name"], FN_NAME)
        if no_such_entity:
            note_text = "AWS IAM Integration: : Workflow <b>{0}</b>: There
were <b>{1}</b> 'MFA devices' <b>{2}</b> " \
                        "which did not exist for user <b>{3}</b> for
Resilient function <b>{4}</b>."\
                .format(WF_NAME, len(no_such_entity_mfas), ",
".join(str(i) for i in no_such_entity_mfas), INPUTS["aws_iam_user_name"],
FN_NAME)
    else:
        note_text += "AWS IAM Integration: Workflow <b>{0}</b>: There was
no result returned for Resilient function <b>{0}</b>."\
            .format(WF_NAME, FN_NAME)
    if DEBUG_SCRIPT:
        incident.addNote(helper.createRichText(note_text))
if __name__ == "__main__":
    main()
```

Function - AWS IAM: Update Login Profile

Changes the password for the specified IAM user. Parameter aws_iam_user_name is an IAM user name. Parameter aws_iam_password is a new password value for an IAM user. Parameter aws_iam_password_reset_required is a boolean value to determine whether a password reset should be required on change.

Example workflows that use this Resilient function include `Example: AWS IAM: Change Profile Password`

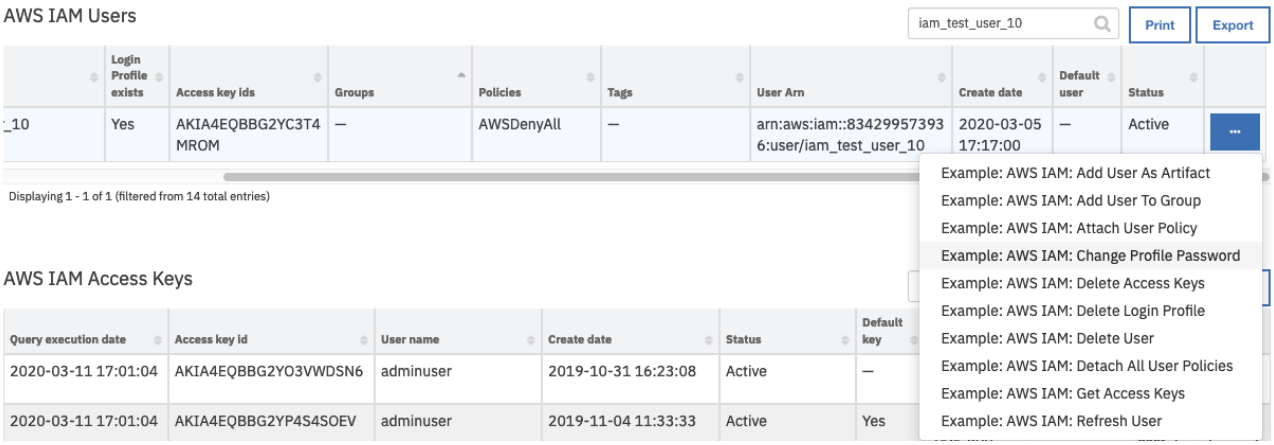
The workflow, `Example: AWS IAM: Change Profile Password`, sets the following input fields for the function:

- aws_iam_user_name is mapped to a user name from the selected row of data table `AWS IAM Users`.
- aws_iam_password is mapped to an activity field input.
- aws_iam_password_reset_required is mapped to a boolean from an activity field drop-down list.

The workflow is initiated by the data table rule, `Example: AWS IAM: Change Profile Password`.

1. Open an incident and select the row of data table `AWS IAM Users` corresponding to the user who needs to have a profile password updated.

2. From the selected row's actions menu, select `Example: AWS IAM: Change Profile Password`.



3. The user is presented with 2 activity fields for a new password a password confirmation and a boolean to indicate if password reset is needed. Set the appropriate values for the fields and click Execute.

Note: The minimum reqirements for a new password is at > 8 characters, at least 1 uppercase and 1 lowercase ascii character.

This invokes the `Example: AWS IAM: Change Profile Password` workflow, which calls the `AWS IAM: Update Login Profile` function.

On successful completion of the workflow, a note is created indicting the status of the action.

▶ Inputs:

Name	Type	Required	Example	Tooltip
`aws_iam_password`	`text`	Yes	`-`	AWS IAM password for user login profile.
`aws_iam_password_reset_required`	`boolean`	Yes	`-`	A password reset required on password change.
`aws_iam_user_name`	`text`	Yes	`AWS IAM user name`	AWS IAM user name.

▶ Outputs:

```
results = {'version': '1.0', 'success': True, 'reason': None,
        'content': 'OK',
        'raw': '"OK"',
        'inputs': {'aws_iam_user_name': 'iam_test_user_1',
'aws_iam_password': '***',
```

```
                    'aws_iam_password_reset_required': False},
          'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
'package_version': '1.0.0',
                     'host': 'myhost.ibm.com',
                     'execution_time_ms': 4300, 'timestamp': '2020-03-13
17:35:48'
                    }
}
```

▶ Example Pre-Process Script:

```
inputs.aws_iam_user_name = row.UserName
# Test password to see it complies with basic password policy.
err_msg_validation = "The new password needs be minimum 8 characters in
length and have at least 1 uppercase and 1 lowercase character."
err_msg_ascii = "The new password must contain only printable ASCII
characters."
if len(rule.properties.aws_iam_password) < 8:
    raise ValueError(err_msg_validation)
if not any(c.isupper() for c in rule.properties.aws_iam_password):
    raise ValueError(err_msg_validation)
if not any(c.islower() for c in rule.properties.aws_iam_password):
    raise ValueError(err_msg_validation)
try:
    rule.properties.aws_iam_password.decode('ascii')
except:
    raise ValueError(err_msg_ascii)
inputs.aws_iam_password = rule.properties.aws_iam_password
inputs.aws_iam_password_reset_required = False
if rule.properties.aws_iam_password_reset_required.lower() == "yes":
    inputs.aws_iam_password_reset_required = True
```

▶ Example Post-Process Script:

```
##  AWS IAM - fn_aws_iam_delete_login_profile script ##

#  Globals
# List of fields in datatable fn_aws_iam_update_login_profile  script
FN_NAME = "fn_aws_iam_update_login_profile"
WF_NAME = "Change Profile Password"
# Processing
CONTENT = results.content
INPUTS = results.inputs
QUERY_EXECUTION_DATE = results["metrics"]["timestamp"]
note_text = ''

def main():
    note_text = ''
    if CONTENT:
```

```
        if CONTENT == "OK":
            note_text = "AWS IAM Integration: Workflow <b>{0}</b>: Login
profile password was updated for user <b>{1}</b> for " \
                        "Resilient function <b>{2}</b>.".format(WF_NAME,
INPUTS["aws_iam_user_name"], FN_NAME)
        elif CONTENT == "PasswordPolicyViolation":
            note_text = "AWS IAM Integration: : Workflow <b>{0}</b>: Login
profile password got policy violation ERROR updating user <b>{1}</b> for "
\
                        "Resilient function <b>{2}</b>.".format(WF_NAME,
INPUTS["aws_iam_user_name"], FN_NAME)
        elif CONTENT == "ValidationError":
            note_text = "AWS IAM Integration: : Workflow <b>{0}</b>: Login
profile password got validation ERROR updating user <b>{1}</b> for " \
                        "Resilient function <b>{2}</b>.".format(WF_NAME,
INPUTS["aws_iam_user_name"], FN_NAME)
        else:
            note_text = "AWS IAM Integration: : Workflow <b>{0}</b>: Login
profile password got unexpected ERROR updating user <b>{1}</b> for " \
                        "Resilient function <b>{2}</b>.".format(WF_NAME,
INPUTS["aws_iam_user_name"], FN_NAME)
    else:
        note_text += "AWS IAM Integration: Workflow <b>{0}</b>: There was
no result returned for Resilient function <b>{0}</b>."\
            .format(WF_NAME, FN_NAME)

    incident.addNote(helper.createRichText(note_text))
if __name__ == "__main__":
    main()
```

Function - AWS IAM: Delete Login Profile

Deletes the password for the specified IAM user, which terminates the user's ability to access AWS services through the AWS Management Console. Parameter aws_iam_user_name is an IAM user name.

Example workflows that use this Resilient function include `Example: AWS IAM: Delete Login Profile`, `Example: AWS IAM: Delete User` and `Example: AWS IAM: Delete User For Artifact`.

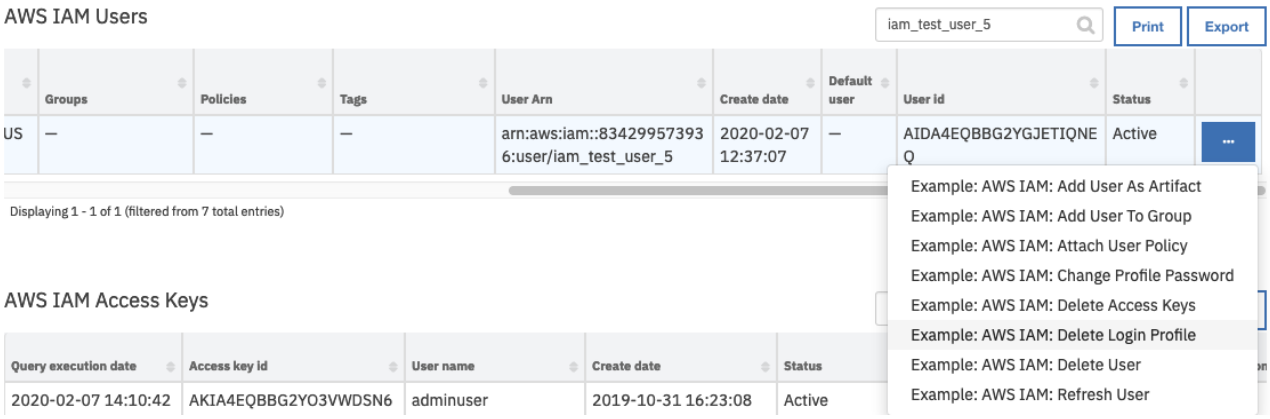
The workflow, `Example: AWS IAM: Delete Login Profile`, sets the following input field for the function:

- aws_iam_user_name is mapped to a user name from the selected row of data table `AWS IAM Users`.

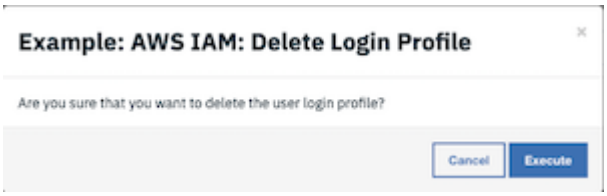
The workflow is initiated by the data table rule, `Example: AWS IAM: Delete Login Profile`.

1. Open an incident and select the row of data table `AWS IAM Users` corresponding to the user whose login profile is to be deleted.

2. From the selected row's actions menu, select `Example: AWS IAM: Delete Login Profile`.

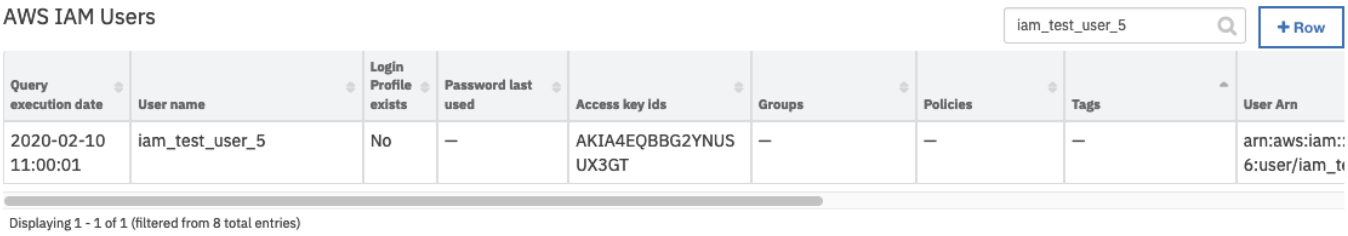


The user is presented with a warning and an option to Execute or Cancel.



3. Press Execute to invoke the `Example: AWS IAM: Delete Login Profile` workflow, which calls the `AWS IAM: Delete Login Profile` function.

On successful completion of the workflow, the `Login Profile exists` field of the `AWS IAM Users` data table is updated to "No" for the selected user.



▶ Inputs:

Name	Type	Required	Example	Tooltip
`aws_iam_user_name`	`text`	Yes	`AWS IAM user name`	AWS IAM user name.

▶ Outputs:

```
results = {
        'version': '1.0', 'success': True, 'reason': None,
        'content': 'OK', 'raw': '"OK"',
        'inputs': {'aws_iam_user_name': 'iam_test_User'},
        'metrics': {'version': '1.0', 'package': 'fn-aws-iam',
'package_version': '1.0.0',
                    'host': 'myhost.ie.ibm.com', 'execution_time_ms':
9170, 'timestamp': '2019-11-18 16:24:17'
                    }
}
```

▶ Example Pre-Process Script:

```
inputs.aws_iam_user_name = row.UserName
```

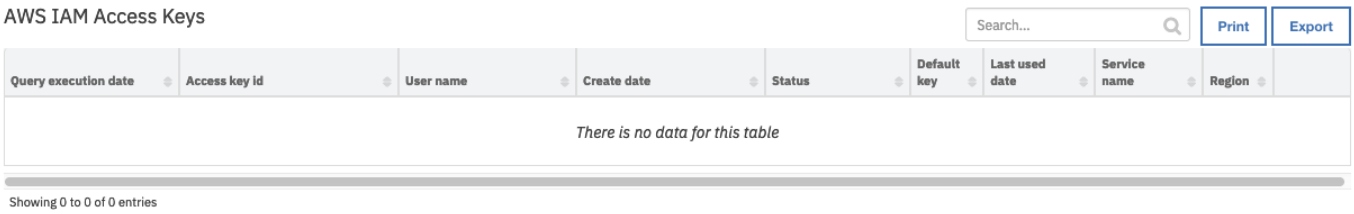
▶ Example Post-Process Script:

```
##  AWS IAM - fn_aws_iam_delete_login_profile script ##
#  Globals
# List of fields in datatable fn_aws_iam_delete_login_profile  script
DATA_TBL_FIELDS = ["Groups"]
FN_NAME = "fn_aws_iam_delete_login_profile"
WF_NAME = "Delete Login Profile"
# Processing
CONTENT = results.content
INPUTS = results.inputs
QUERY_EXECUTION_DATE = results["metrics"]["timestamp"]
note_text = ''

def main():
    note_text = ''
    if CONTENT:
        if CONTENT == "OK":
            note_text = "AWS IAM Integration: Workflow <b>{0}</b>: Login
profile deleted for user <b>{1}</b> for " \
                        "Resilient function <b>{2}</b>.".format(WF_NAME,
INPUTS["aws_iam_user_name"], FN_NAME)
            row.LoginProfileExists = "No"
        elif CONTENT == "NoSuchEntity":
            note_text = "AWS IAM Integration: : Workflow <b>{0}</b>: Login
profile does not exist for user <b>{1}</b> for " \
                        "Resilient function <b>{2}</b>.".format(WF_NAME,
INPUTS["aws_iam_user_name"], FN_NAME)
            row.LoginProfileExists = "No"
    else:
        note_text += "AWS IAM Integration: Workflow <b>{0}</b>: There was
no result returned for Resilient function <b>{0}</b>."\
            .format(WF_NAME, FN_NAME)

    incident.addNote(helper.createRichText(note_text))
if __name__ == "__main__":
    main()
```

Data Table - AWS IAM Access Keys



API Name:

aws_iam_access_keys

Columns:

Column Name	API Access Name	Type	Tooltip
Access key id	`AccessKeyId`	`text`	-
Create date	`CreateDate`	`text`	-
Default key	`DefaultKey`	`text`	-
Last used date	`LastUsedDate`	`text`	-
Region	`Region`	`text`	-
Service name	`ServiceName`	`text`	-
Status	`Status`	`text`	-
User name	`UserName`	`text`	-
Query execution date	`query_execution_date`	`text`	-

Data Table - AWS IAM Users

API Name:

aws_iam_users

Columns:

Column Name	API Access Name	Type	Tooltip
Access key ids	`AccessKeyIds`	`text`	-
User Arn	`Arn`	`text`	-

Column Name	API Access Name	Type	Tooltip
Create date	`CreateDate`	`text`	-
Default user	`DefaultUser`	`text`	-
Groups	`Groups`	`text`	-
Login Profile exists	`LoginProfileExists`	`text`	-
Policies	`Policies`	`text`	-
Status	`Status`	`text`	-
Tags	`Tags`	`text`	-
User name	`UserName`	`text`	-
Query execution date	`query_execution_date`	`text`	-

Custom Artifact Types

Display Name	API Access Name	Description
AWS IAM User Name	`aws_iam_user_name`	Amazon Web Services (AWS) IAM user name.
AWS IAM Access Key ID	`aws_iam_access_key_id`	Amazon Web Services (AWS) IAM access key ID.

Rules

Rule Name	Object	Workflow or Script Triggered
Example: AWS IAM: List Users	incident	`wf_aws_iam_list_users`
Example: AWS IAM: Delete User For Artifact	artifact	`wf_aws_iam_delete_user_for_artifact`
Example: AWS IAM: Remove User From All Groups	aws_iam_users	`wf_aws_iam_remove_user_from_all_groups`
Example: AWS IAM: Delete Access Key For Artifact	artifact	`wf_aws_iam_delete_access_key_for_artifact`
Example: AWS IAM: Get User For Artifact	artifact	`wf_aws_iam_get_user_for_artifact`

Rule Name	Object	Workflow or Script Triggered
Example: AWS IAM: Get access Key For Artifact	artifact	wf_aws_iam_get_access_key_for_artifact
Example: AWS IAM: Add User As Artifact	aws_iam_users	scr_aws_iam_add_user_as_artifact
Example: AWS IAM: Refresh User	aws_iam_users	wf_aws_iam_refresh_user
Example: AWS IAM: Attach User Policy	aws_iam_users	wf_aws_iam_attach_user_policy
Example: AWS IAM: Change Profile Password	aws_iam_users	wf_aws_iam_change_profile_password
Example: AWS IAM: Delete Access Keys	aws_iam_users	wf_aws_iam_delete_access_keys
Example: AWS IAM: Deactivate Access Key	aws_iam_access_keys	wf_aws_iam_deactivate_access_key
Example: AWS IAM: Delete User	aws_iam_users	wf_aws_iam_delete_user
Example: AWS IAM: Delete Login Profile	aws_iam_users	wf_aws_iam_delete_login_profile
Example: AWS IAM: Add Access Key As Artifact	aws_iam_access_keys	scr_aws_iam_add_access_key_as_artifact
Example: AWS IAM: List Access Keys	incident	wf_aws_iam_list_access_keys
Example: AWS IAM: Detach All User Policies	aws_iam_users	wf_aws_iam_detach_all_user_policies
Example: AWS IAM: Get Access Keys	aws_iam_users	wf_aws_iam_get_access_keys
Example: AWS IAM: Get User	aws_iam_access_keys	wf_aws_iam_get_user
Example: AWS IAM: Add User To Group	aws_iam_users	wf_aws_iam_add_user_to_group
Example: AWS IAM: Delete Access Key	aws_iam_access_keys	wf_aws_iam_delete_access_key

Rule Name	Object	Workflow or Script Triggered
Example: AWS IAM: Refresh Access Key	aws_iam_access_keys	`wf_aws_iam_refresh_access_key`