T&I Incubator: OIDC Support for SSH under Windows

Final demo – 21st September 2021

Dmytro Dehtyarov

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Agenda

- Motivation & Background
- Port oidc-agent to Windows
- Communication with oidc-agent
- Integration with putty
- Outlook

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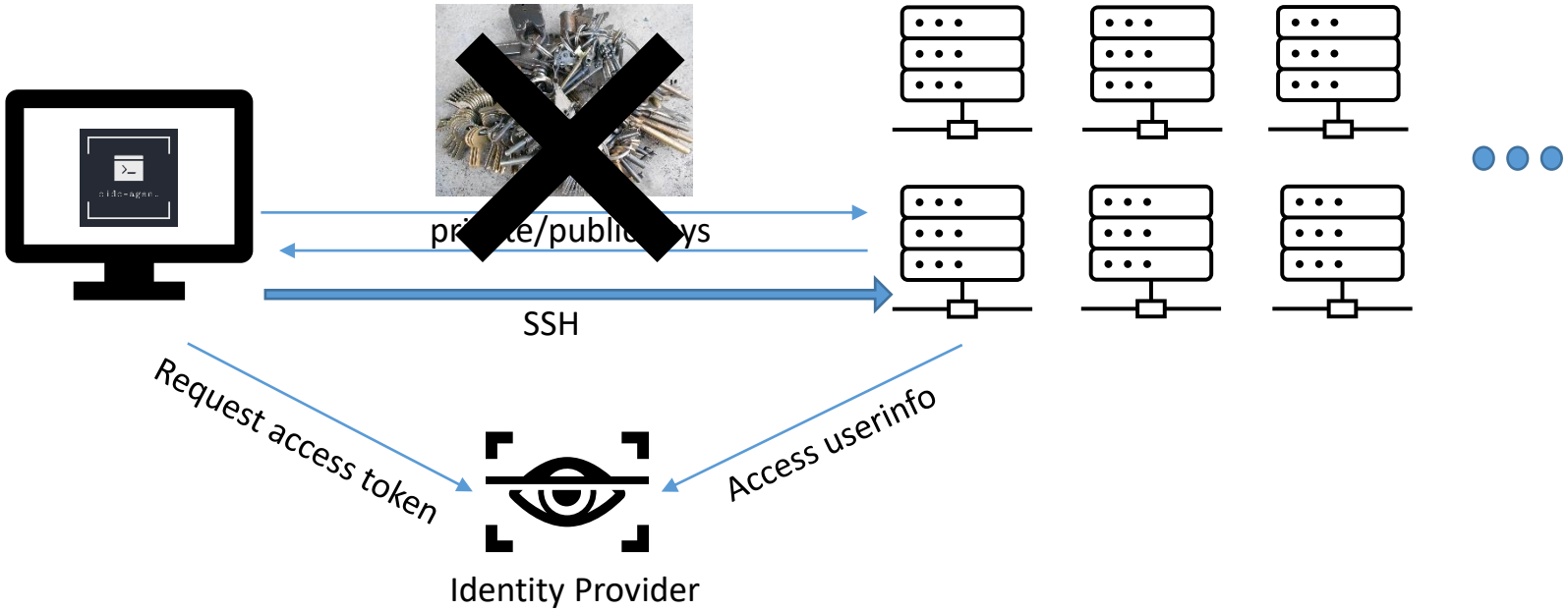
Motivation

- SSH Key Management
- Risks of untracked and unmanaged SSH Keys
- 90% of keys are no longer used [1]

[2]

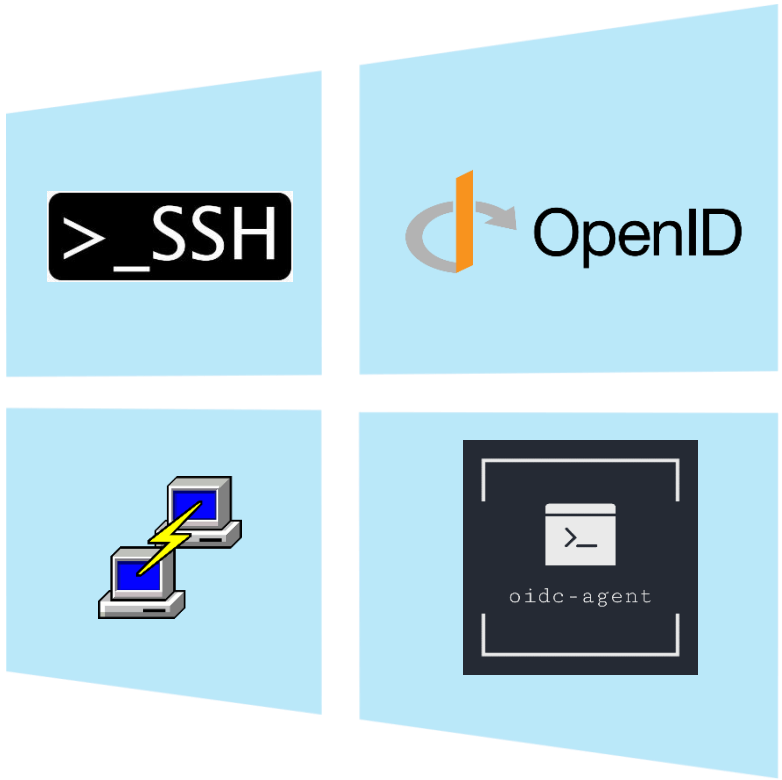
Motivation

Access Tokens!



Goals

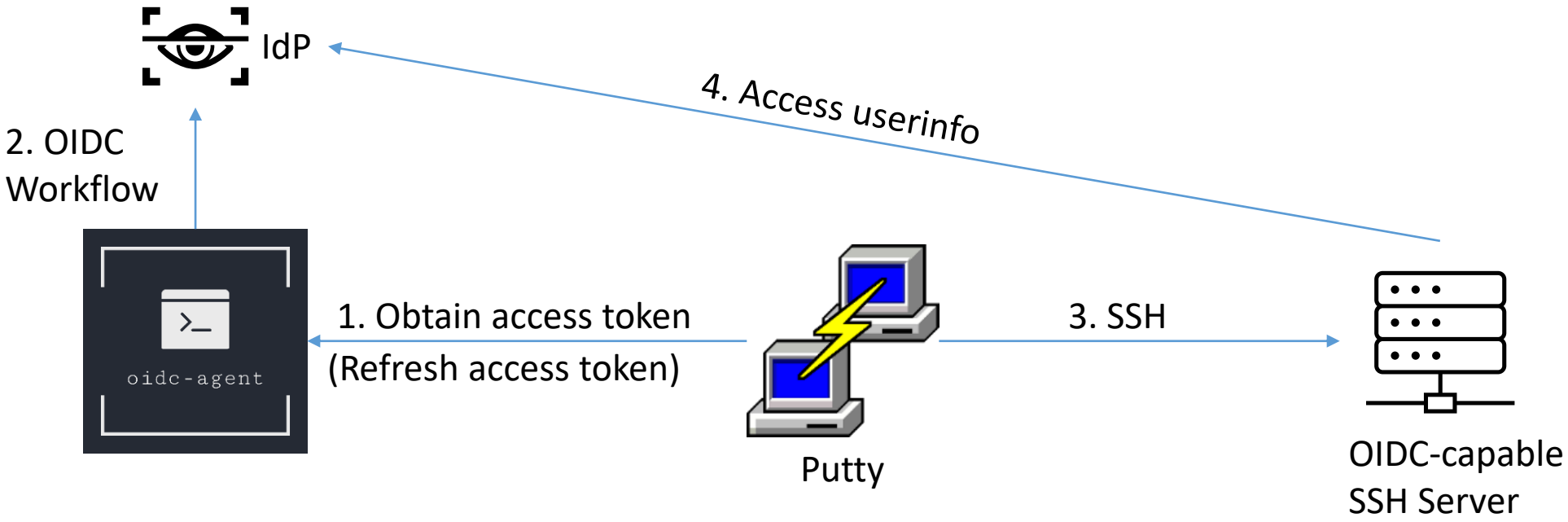
- High-Level: Integrate OIDC with SSH (client-side) under **Windows**
  - Port oidc-agent to Windows
  - Integrate oidc-agent into SSH client Putty
  - Extend putty for access token based authentication



[3][4][5][6][7]

High-Level Architecture

- oidc-agent VS. ssh-agent



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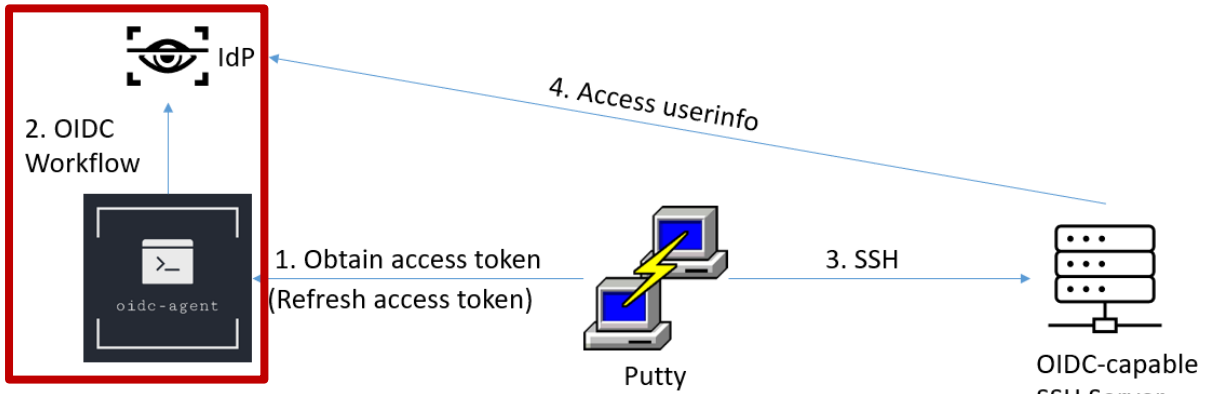
oidc-agent

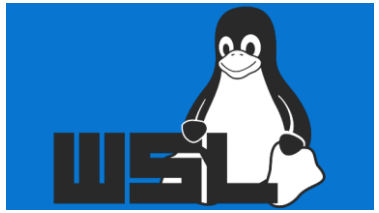
- Command-line tools
  - oidc-agent
  - oidc-gen
  - oidc-add
  - oidc-token
- Available for Linux and MacOS

https://github.com/indigo-dc/oidc-agent



Possibilities to port oidc-agent

- ✗ Windows Subsystem for Linux 2
  - No changes to source code
  - Not user-friendly
- ✗ Build natively
  - Rewrite platform-dependent code (IPC, pthreads, etc)
- ✓ POSIX emulation layer – Cygwin, MSYS
  - Moderate changes to source code
  - Semi-native approach



[8]

libsodium [9]

Libmicrohttpd [10]

[11]

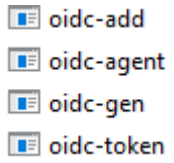
[12]

Build oidc-agent with MSYS2

- Source code modifications
  - Using compiler directives
  - Excluded functionalities
  - Implemented registry connector
  - Adapted building procedures
- Build with ‚make‘
  - Same codebase
  - Produces .exe binaries
- Build&Installation script

```
#ifdef __MSYS__
#include <windows.h>
#endif
```

```
GEANT@finrod2 MSYS ~/oidc-agent
$ make
Compiled src/utils/registryConnector.c successfully!
Compiled src/ipc/cryptCommunicator.c successfully!
Compiled src/ipc/ipc.c successfully!
Compiled src/api/comm.c successfully!
Compiled src/api/tokens.c successfully!
Linking bin/oidc-agent complete!
Linking bin/oidc-gen complete!
Linking bin/oidc-add complete!
Compiled src/api/comm.c with pic successfully!
Compiled src/api/tokens.c with pic successfully!
Compiled src/ipc/ipc.c with pic successfully!
Compiled src/ipc/cryptCommunicator.c with pic successfully!
Compiled src/utils/registryConnector.c with pic successfully!
Compiled src/oidc-token/oidc-token.c successfully!
Linking bin/oidc-token complete!
```

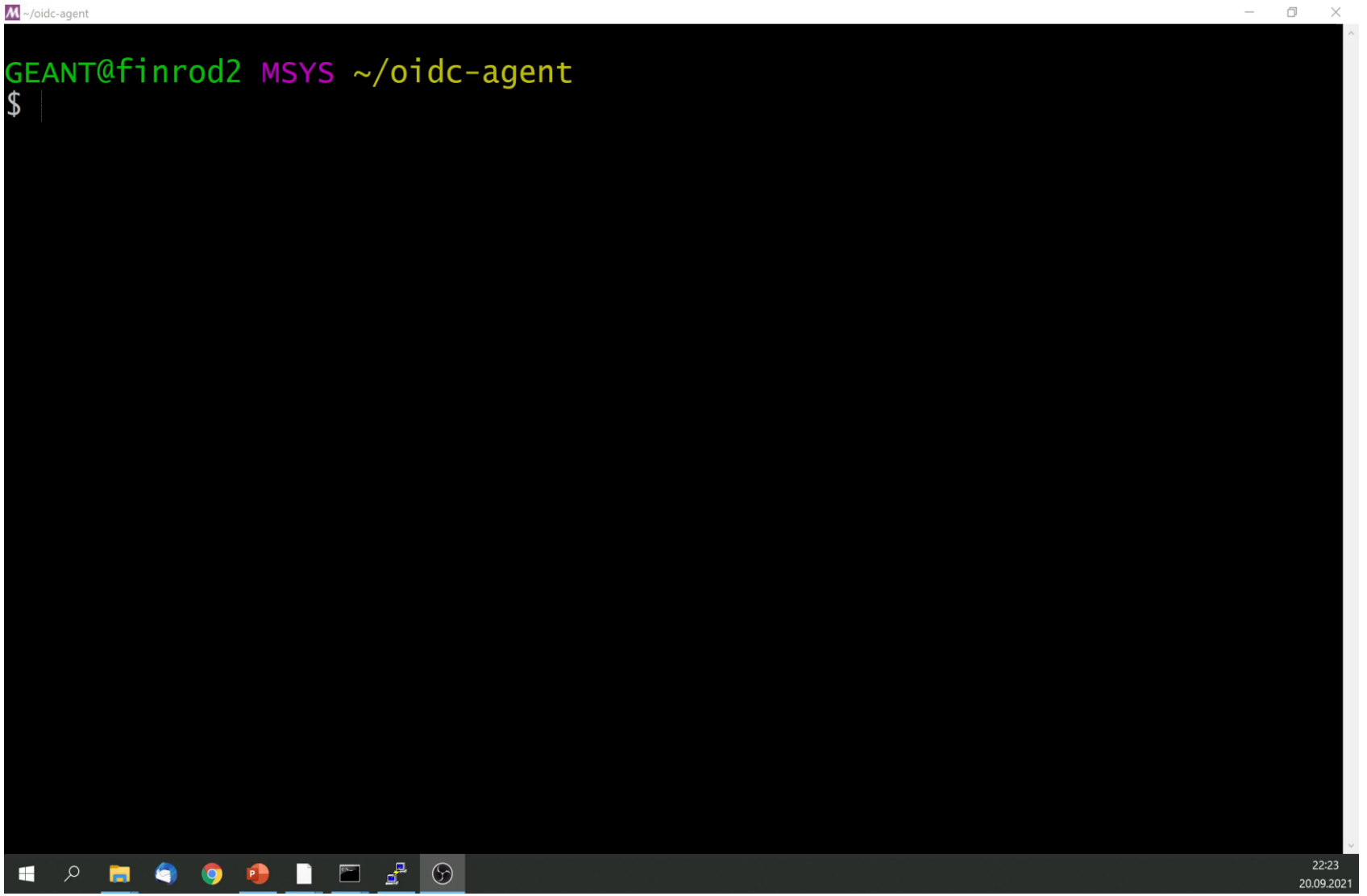


oidc-agent on Windows

- Github
  - https://github.com/indigo-dc/oidc-agent/tree/windows

Demo

oidc-agent on Windows



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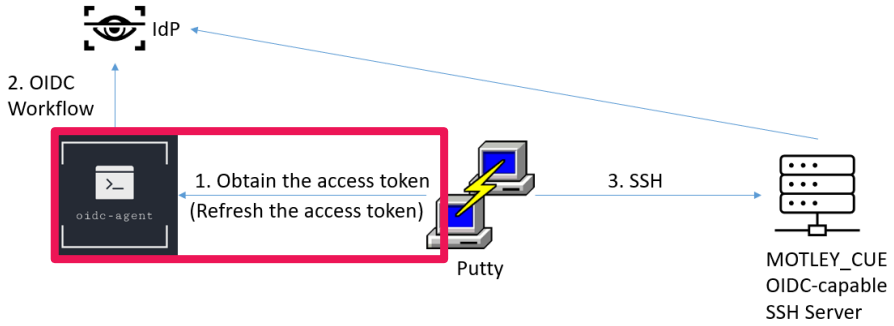
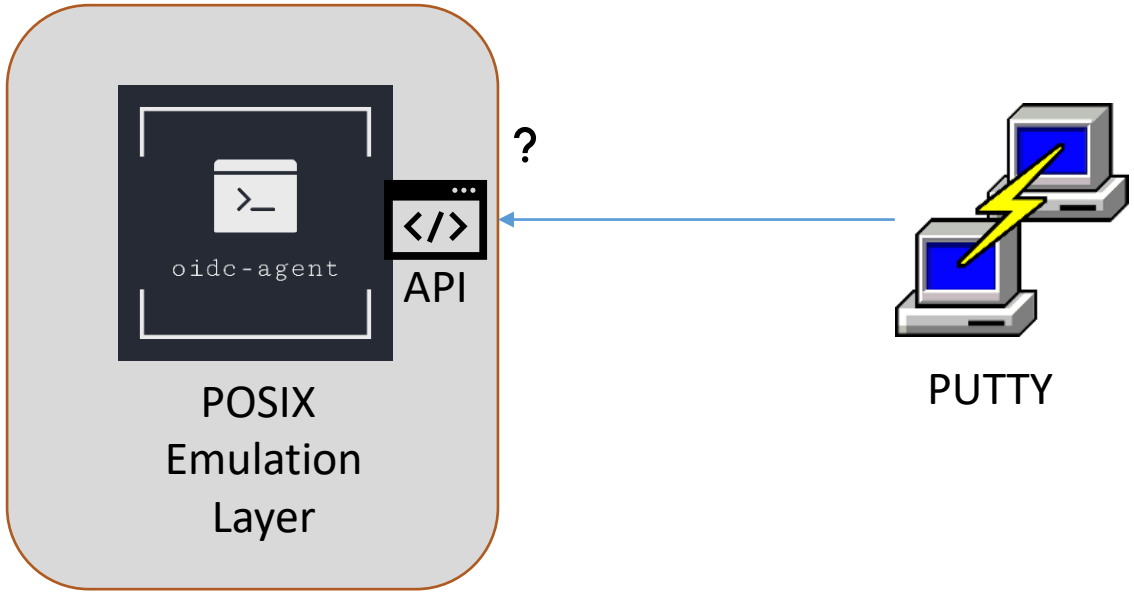
liboidc-agent API

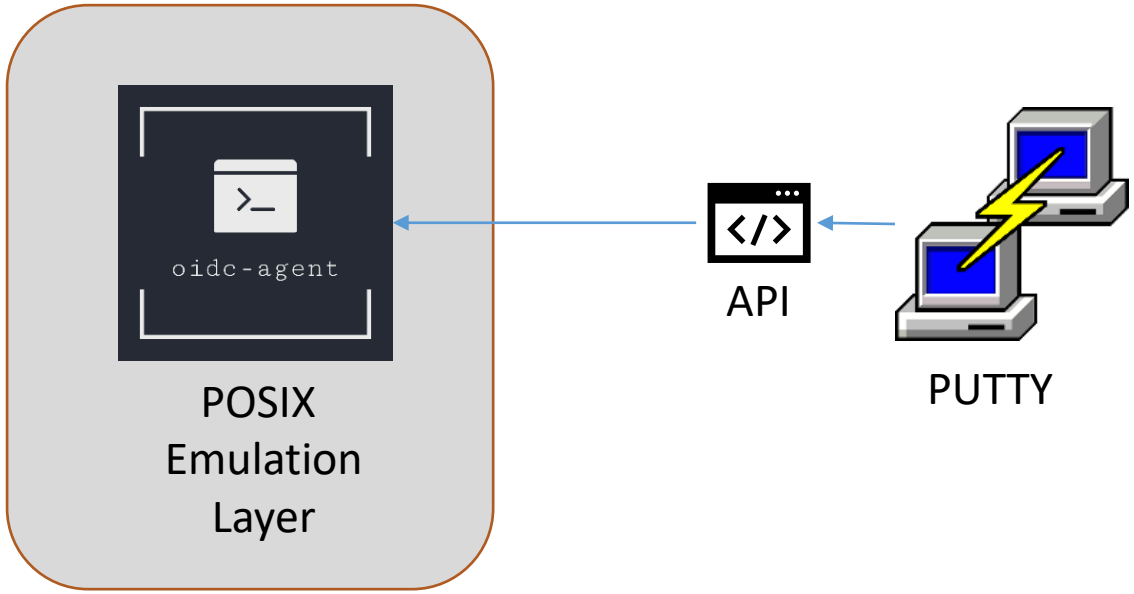
- Static/dynamic library
  - Unix Domain Sockets
  - Requires compatibility layer!
- Goal: compile API library natively





Native liboidc-agent API library

- Reimplemented IPC using winsock
- Talk directly with emulated sockets
  - Authentication handshake
- Compiled using mingw-w64 (MSYS2 or cross-compile on Linux)



Native liboidc-agent API library

- Originally only for oidc-token
- Refactored & extended for other tools
- Following endpoints available:
  - getAccessToken
  - getAccessTokenForIssuer
  - getLoadedAccountsList

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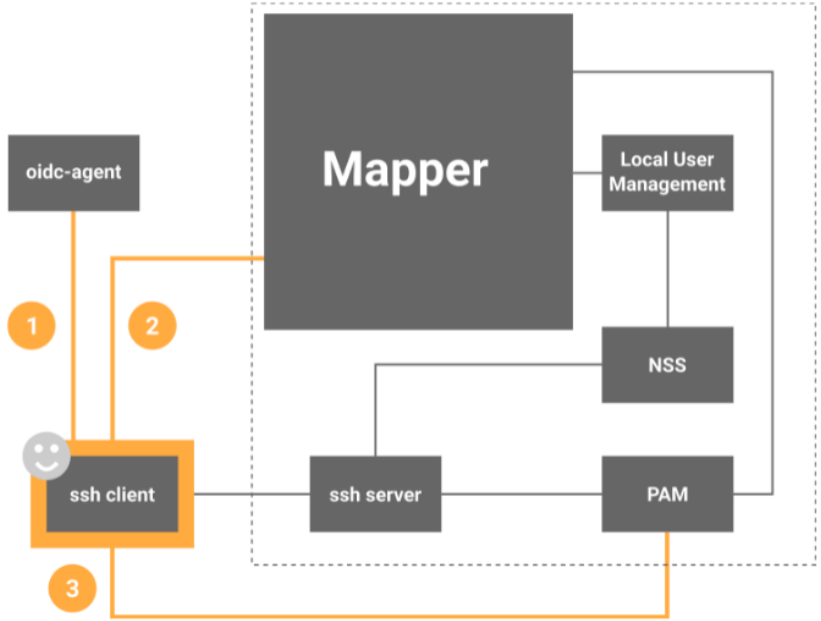
Putty

- Client for **SSH**, Telnet, …
- Putty, Plink, PSFTP, PSCP
- Originally written for Windows
- Supports authentication:
  - no-auth
  - password
  - public key
  - Gssapi
  - **keyboard-interactive**
  - **… OIDC access tokens**

OIDC Based Authentication

- Server:
  - SSH server with pam-ssh-oidc
  - Mapping daemon motley_cue

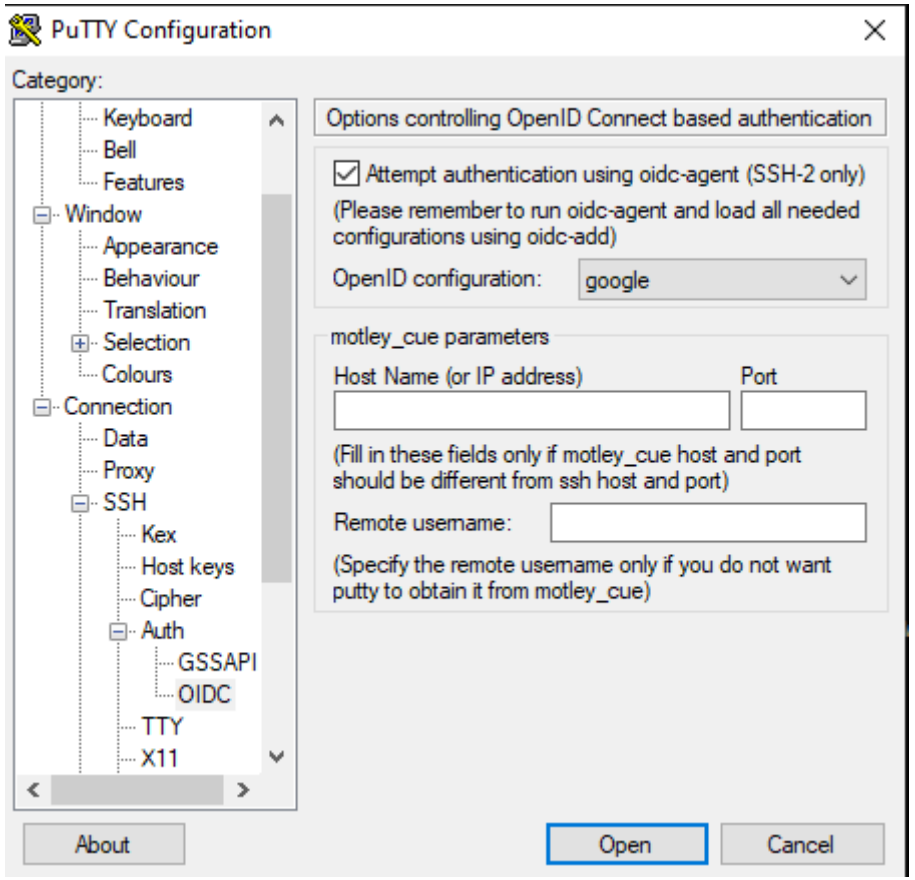
1. Retrieve access token
2. Deploy local account/get username
3. Input access token when prompted
   - Subtype of keyboard-interactive auth



[13]

OIDC Based Authentication

- Available for:
  - Putty
  - Plink
  - PSFTP
  - PSCP
- Built using mingw-w64
  - Windows (MSYS2 – mingw32)
  - Cross-compile on Linux

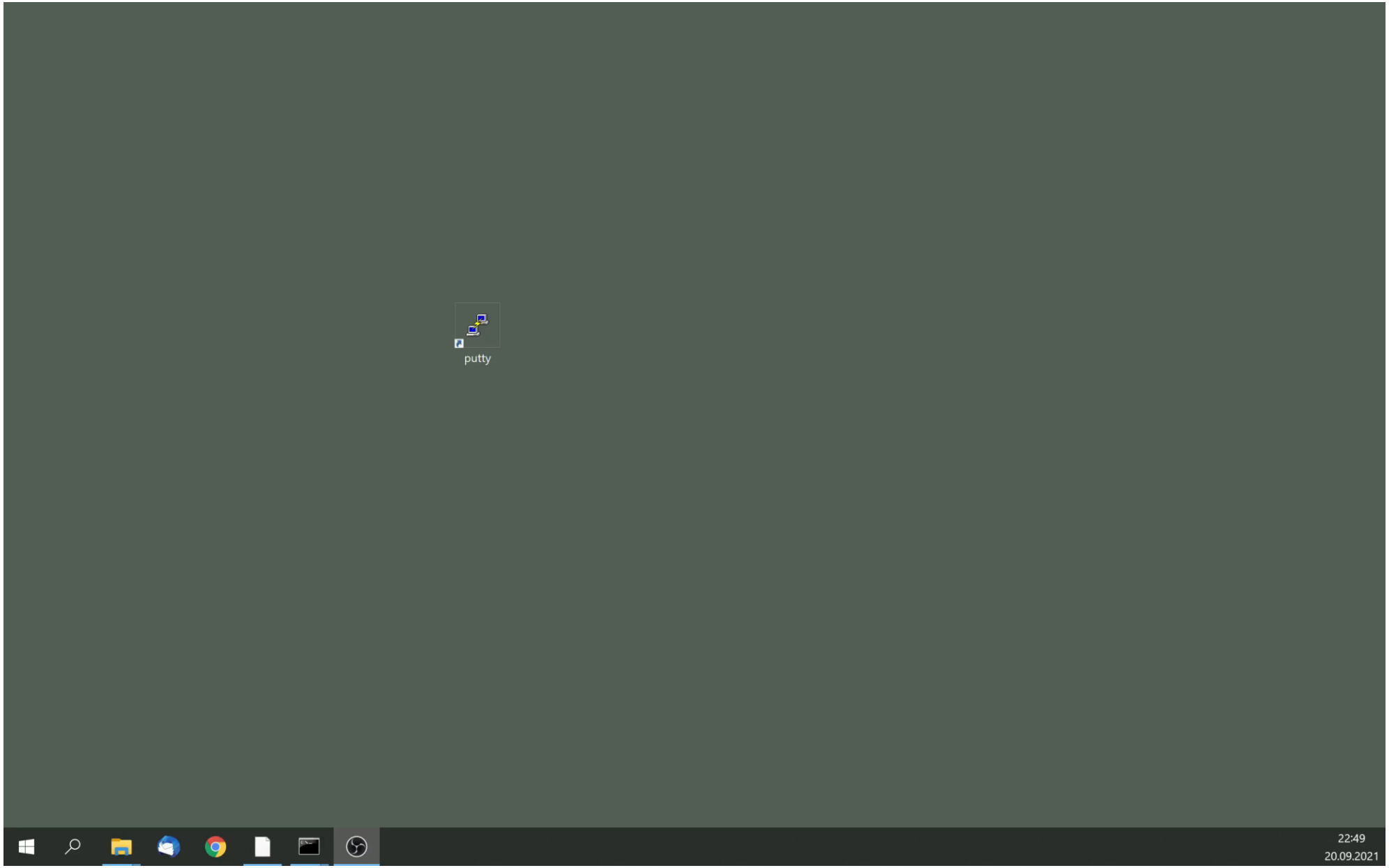



```
C:\msys64_putty\home\GEANT\putty\windows>plink -oidc-agent google -mc-host ssh-oidc-demo.data.kit.edu ssh-oidc-demo.data.kit.edu
-- Keyboard-interactive authentication prompts from server: ------------------
-- Passed OIDC access token ------------------------------------------------
-- End of keyboard-interactive prompts from server --------------------------
Access granted. Press Return to begin session.
```

OIDC Based Authentication

- Git:
  - https://git.scc.kit.edu/m-team/putty/-/tree/oidc-support

Demo


putty
22:49
20.09.2021

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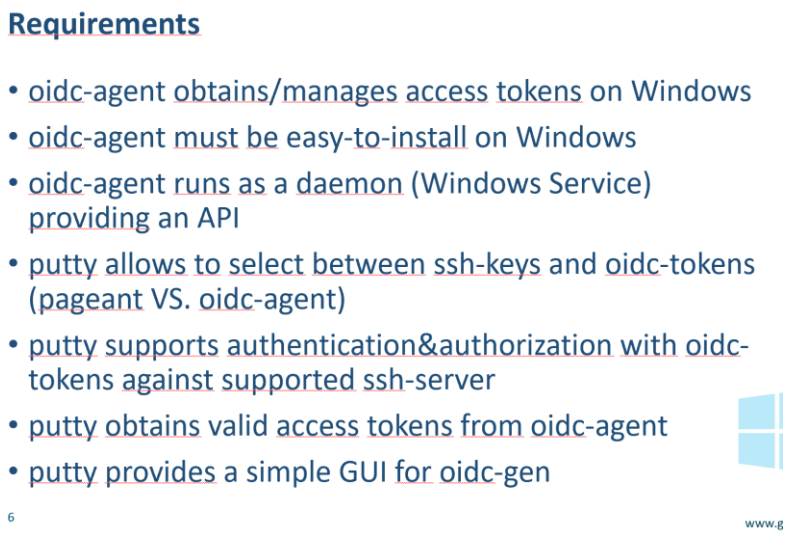
Outlook

- Provide installer for oidc-agent
  - Better user-experience
- Build liboidc-agent.lib for Windows environment (MSVC)
- Provide OIDC support for Putty under supported compilers
  - Clang
  - MSVC
  - LCC
- Discuss and publish putty extension

Summary

- All requirements satisfied
- oidc-agent runs on Windows
- liboidc-agent works on Windows
- Putty supports authentication with access tokens for SSH



Thank you

Any questions?

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References

[1] https://www.ssh.com/academy/iam/ssh-key-management

[2] https://images.app.goo.gl/8CTV52CRGRxJrBRLA

[3] https://images.app.goo.gl/jzgLw2zjqKzwi7cp9

[4] https://images.app.goo.gl/tKo77xxstdu1DUJr5

[5] https://images.app.goo.gl/bUgQzq5YaTPamEXP8

[6] https://github.com/indigo-dc/oidc-agent/blob/master/logo.png

[7] https://images.app.goo.gl/TJy4y5WigecQJ3sU7

[8] https://docs.microsoft.com/en-us/windows/wsl/

[9] https://images.app.goo.gl/jzXenF4tMquP19HCA

[10] https://images.app.goo.gl/KTBckfa6R4mibR8z9

[11] https://images.app.goo.gl/CBiCK5SqUDRksqt69

[12] https://images.app.goo.gl/M1eHHZSzY1cc9X37A

[13] https://docs.google.com/presentation/d/17HM11YjafC5VA4_o2EjNrtbRqJGgQP0q92C_uqFAM6A/edit

[14] https://images.app.goo.gl/Jaxk9RcesMzGCcS99