# Ready for Windows 11 in your endpoint device park?

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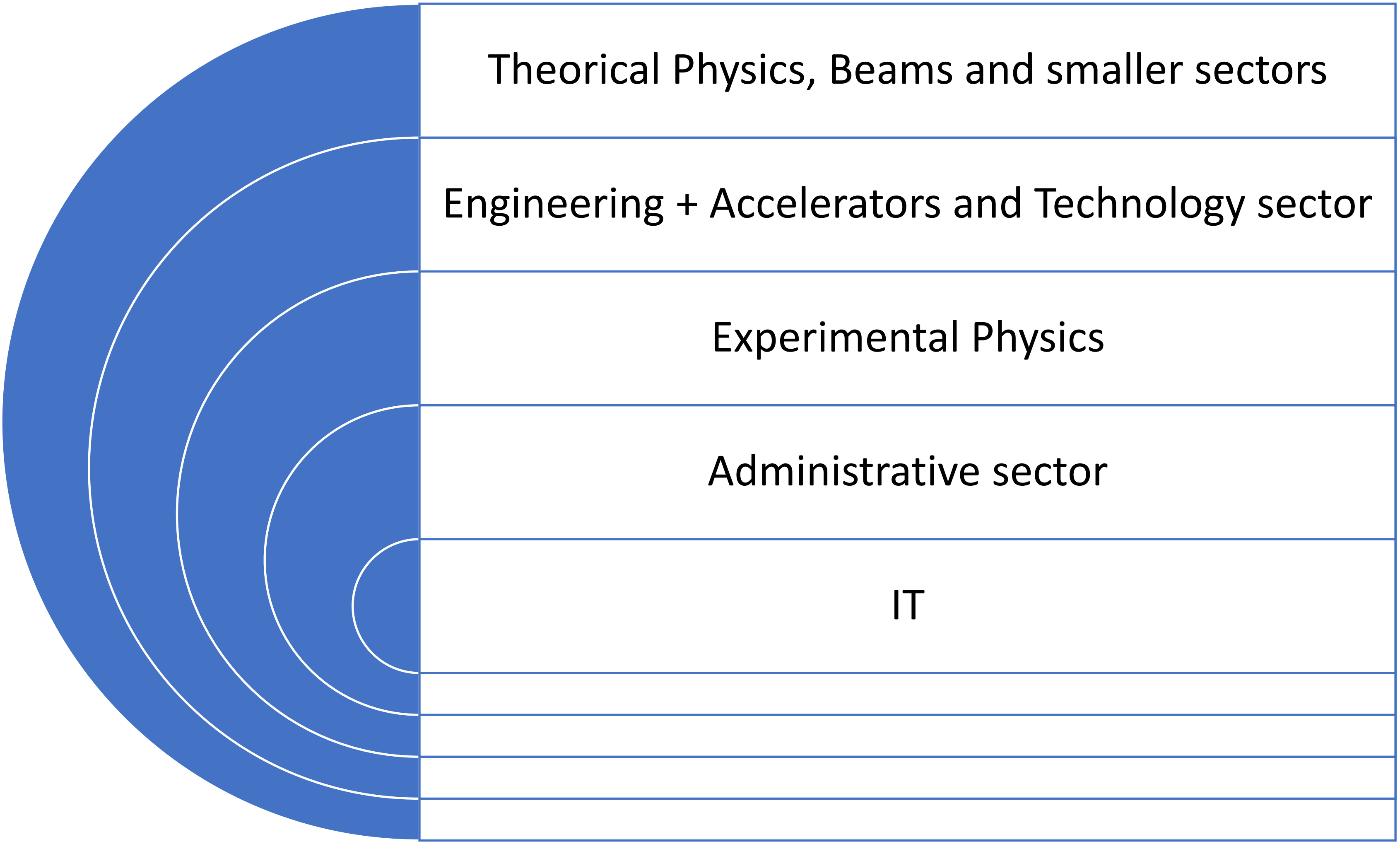
HEPiX 2024 (Spring)

# In this talk :

- CERN-Managed device park overview
- Past experiences with major Windows upgrades
- Challenges of migration to Windows 11
  - Establishing device compatibility
  - Migration mechanics
  - Software compatibility
  - Data Privacy with Microsoft Copilot
  - Migration planning
- And what if you cannot migrate?

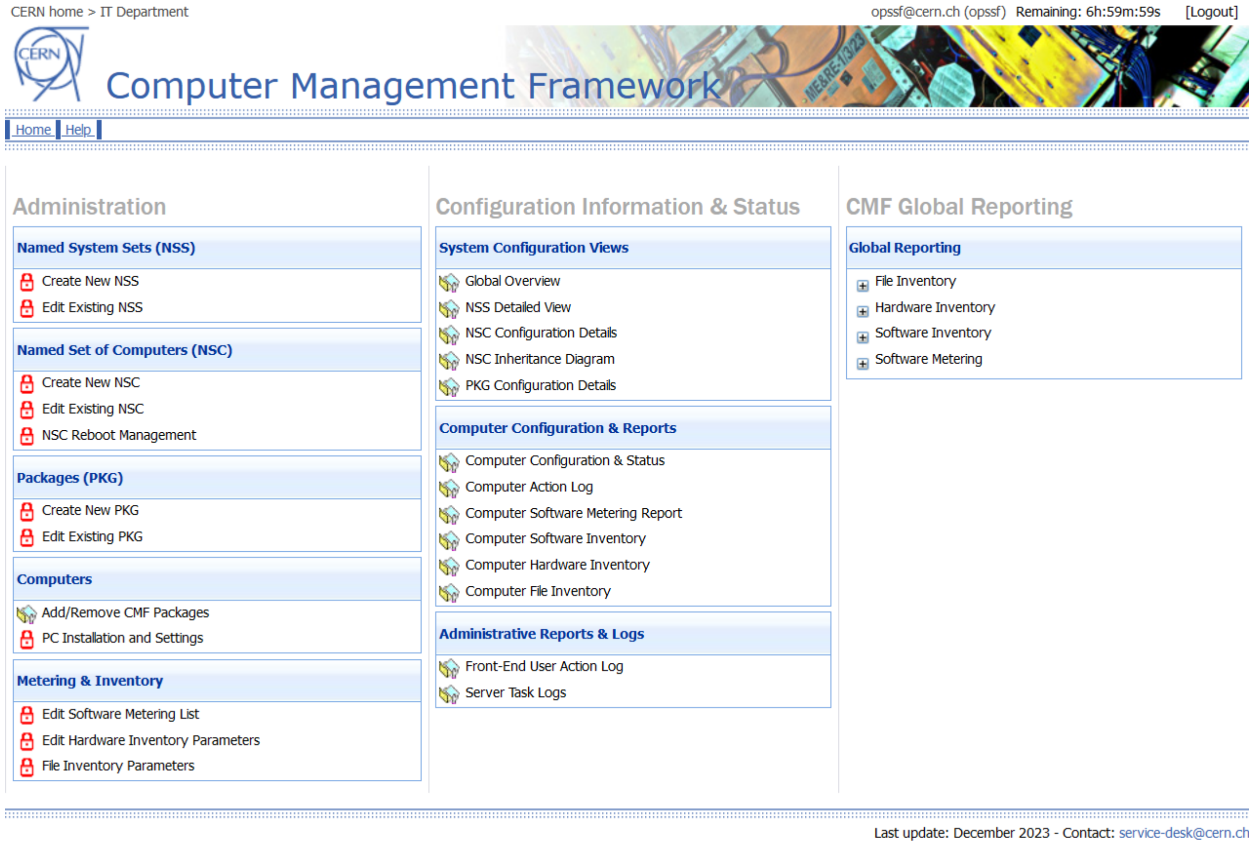
# CERN-managed device park overview

- 10000 CERN managed Windows endpoints
  - Deployment is staged in 5 rings which progressively include all CERN sectors
  - For a tailored schedule, we use different tools:
    - Windows Update (GPOs)
    - CMF


Theorical Physics, Beams and smaller sectors
Engineering + Accelerators and Technology sector
Experimental Physics
Administrative sector
IT

# Past experiences with major Windows upgrades

- Tools we use
  - CMF is a CERN proprietary software deployment tool (similar to System Center Configuration Manager from Microsoft)
    - Used mainly to deploy software and feature updates with a tailored schedule



CERN home > IT Department

opssf@cern.ch (opssf) Remaining: 6h:59m:59s [Logout]

Computer Management Framework

Home | Help

**Administration**

**Named System Sets (NSS)**
- Create New NSS
- Edit Existing NSS

**Named Set of Computers (NSC)**
- Create New NSC
- Edit Existing NSC
- NSC Reboot Management

**Packages (PKG)**
- Create New PKG
- Edit Existing PKG

**Computers**
- Add/Remove CMF Packages
- PC Installation and Settings

**Metering & Inventory**
- Edit Software Metering List
- Edit Hardware Inventory Parameters
- File Inventory Parameters

**Configuration Information & Status**

**System Configuration Views**
- Global Overview
- NSS Detailed View
- NSC Configuration Details
- NSC Inheritance Diagram
- PKG Configuration Details

**Computer Configuration & Reports**
- Computer Configuration & Status
- Computer Action Log
- Computer Software Metering Report
- Computer Software Inventory
- Computer Hardware Inventory
- Computer File Inventory

**Administrative Reports & Logs**
- Front-End User Action Log
- Server Task Logs

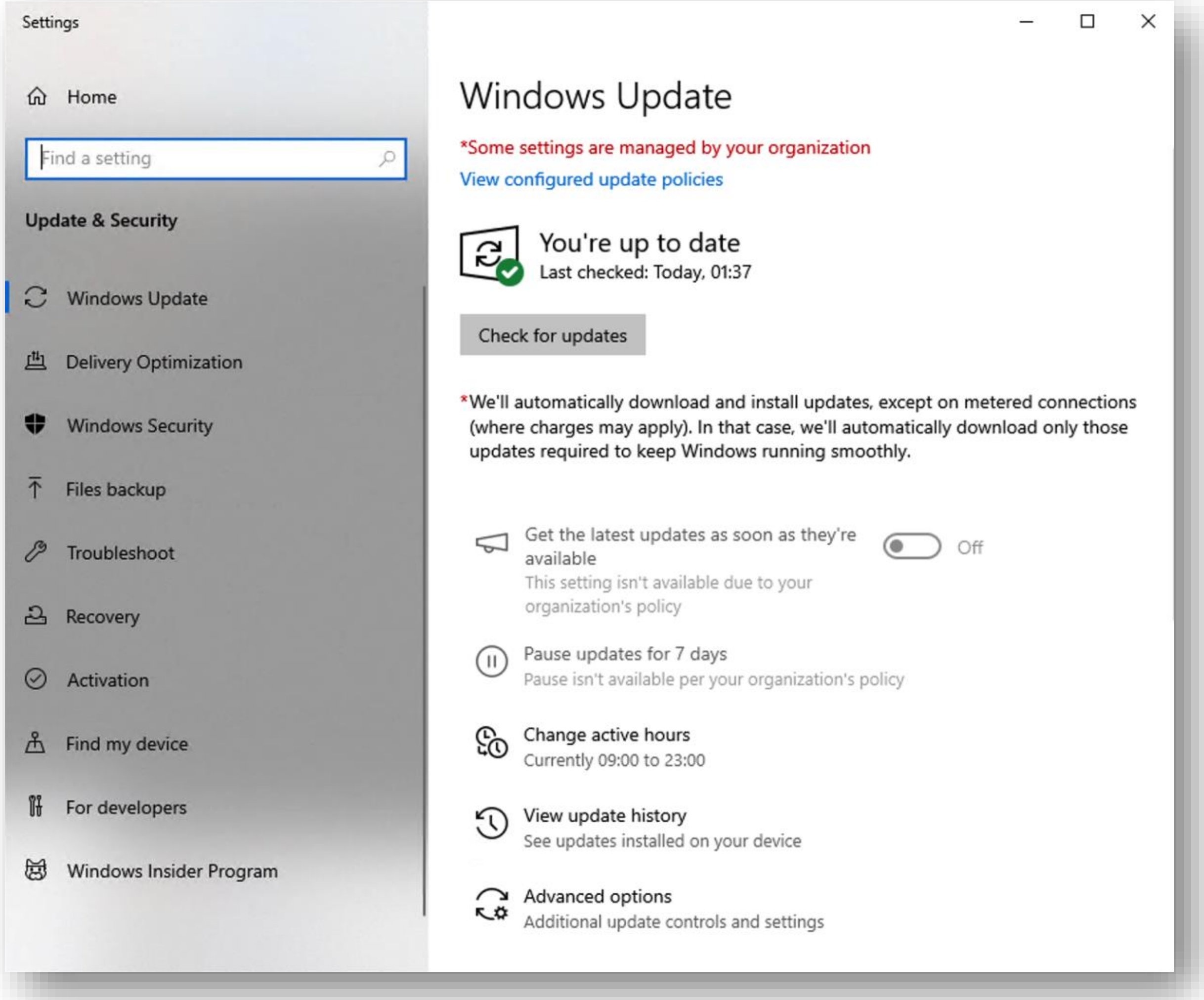
**CMF Global Reporting**

**Global Reporting**
- File Inventory
- Hardware Inventory
- Software Inventory
- Software Metering

Last update: December 2023 - Contact: service-desk@cern.ch

# Past experiences with major Windows upgrades

- Tools we use
  - Windows Update is a built-in update mechanism provided by Microsoft on Windows.
    - Used by default CERN-wide to deploy quality updates and feature updates with a flexible schedule
    - Very useful when devices are not connected to the CERN Network; scheduling capabilities more limited than in CMF



Windows Update

*Some settings are managed by your organization

View configured update policies

You're up to date
Last checked: Today, 01:37

*We'll automatically download and install updates, except on metered connections (where charges may apply). In that case, we'll automatically download only those updates required to keep Windows running smoothly.

Get the latest updates as soon as they're available — Off
This setting isn't available due to your organization's policy

Pause updates for 7 days
Pause isn't available per your organization's policy

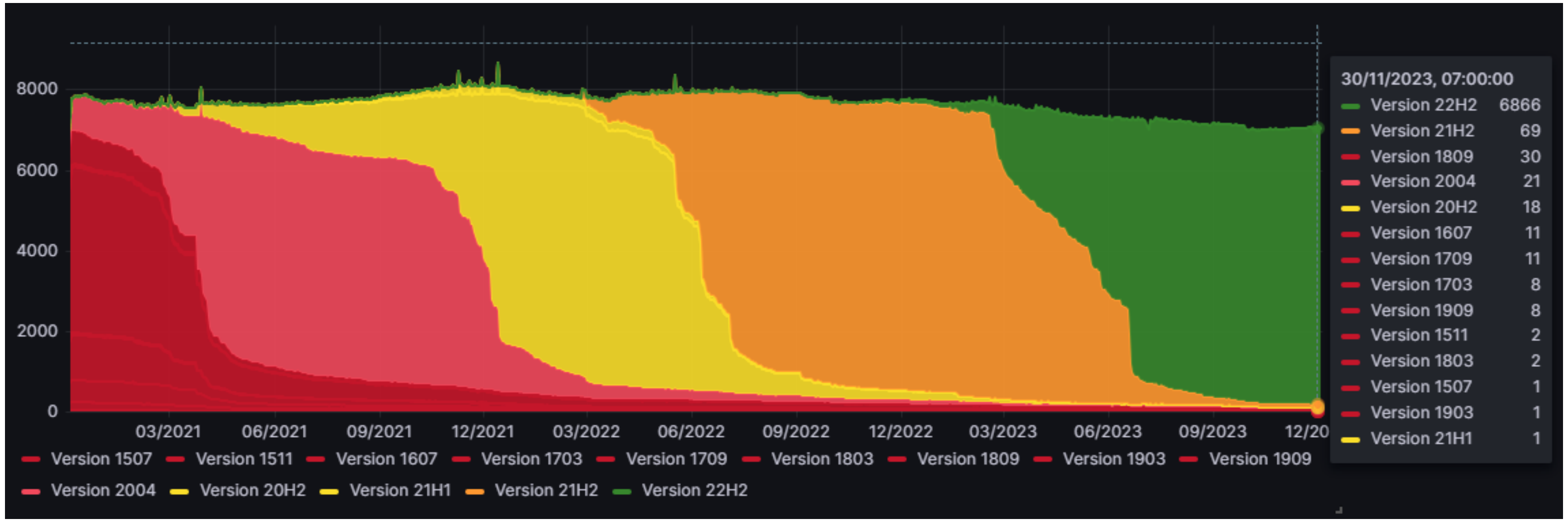
Change active hours
Currently 09:00 to 23:00

View update history
See updates installed on your device

Advanced options
Additional update controls and settings

# Past experiences with major Windows upgrades

- Previous migrations
  - Upgrading from Windows 7 to Windows 10 was easier
    - Windows 10 require a processor running at 1GHz minimum
    - The first 1GHz Intel processor was the Pentium III released already in 1999, **15 years before Windows 10.**
  - Migrating from one Windows build to another was almost flawless using the tools mentioned before as requirements didn't change over time.



30/11/2023, 07:00:00

| | |
|---|---|
| Version 22H2 | 6866 |
| Version 21H2 | 69 |
| Version 1809 | 30 |
| Version 2004 | 21 |
| Version 20H2 | 18 |
| Version 1607 | 11 |
| Version 1709 | 11 |
| Version 1703 | 8 |
| Version 1909 | 8 |
| Version 1511 | 2 |
| Version 1803 | 2 |
| Version 1507 | 1 |
| Version 1903 | 1 |
| Version 21H1 | 1 |

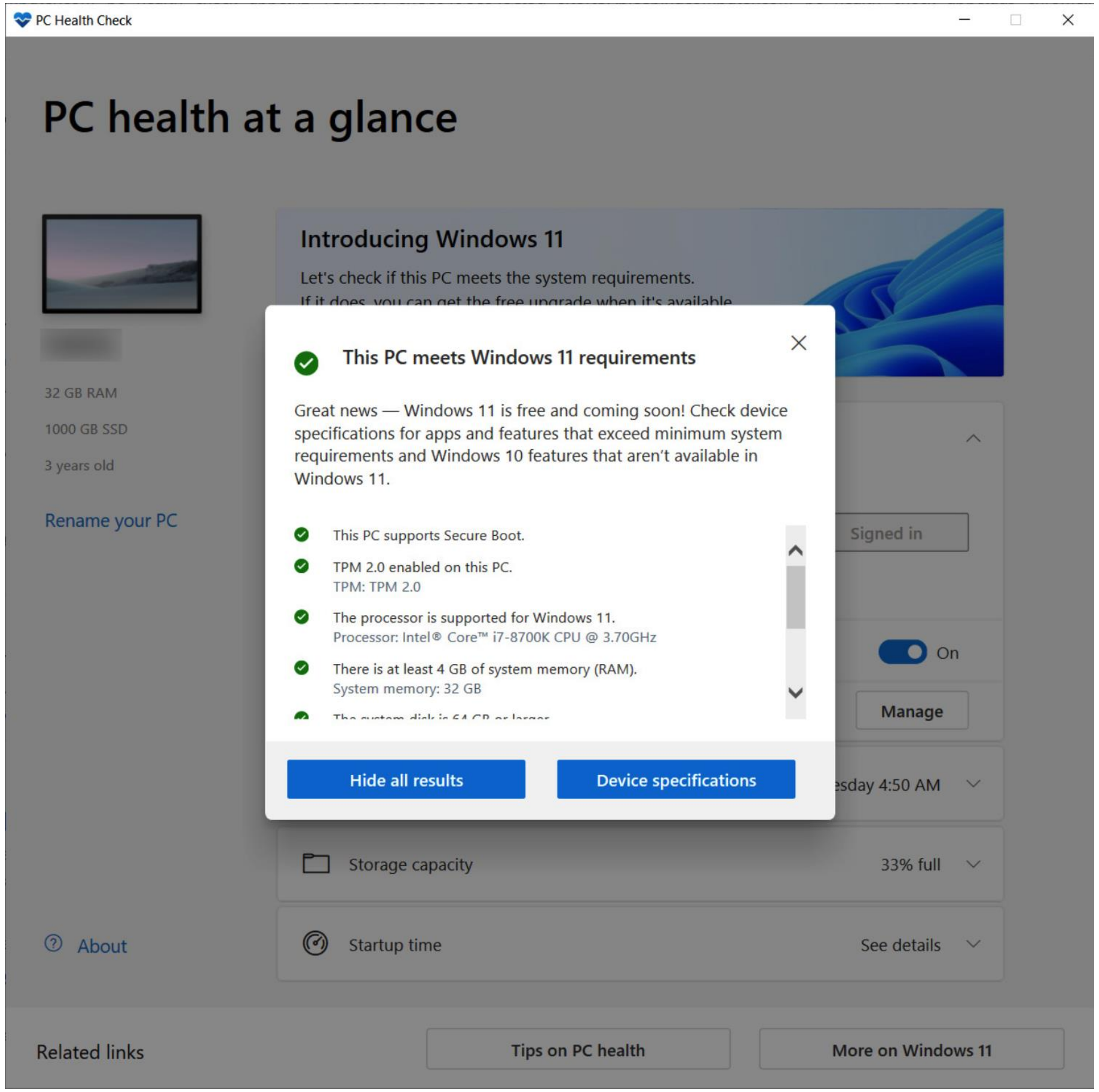
# Challenges of migration to Windows 11

- Windows 11 hardware requirements are more restrictive:

| | Windows 10 | Windows 11 |
|---|---|---|
| **Processor Minimum** | 1GHz CPU or SOC | 1GHz on a CPU that is not older than 2017 (8th Gen) with at least 2 cores |
| **TPM 2.0 and UEFI** | Not Required | Required |
| **Storage for upgrade installation** | 20Gb | 64Gb |
| **RAM requirements for 32bits system** | 1Gb | Not Supported |
| **RAM requirements for 64bits system** | 2Gb | 4Gb |
| **Display Minimum** | Direct X 9 , WDDM 1.0 driver, 800x600 resolution | Direct X 12, WDDM 2.0 driver, 8bits / colour channel, HD support |

# Establishing device compatibility 1/4

- PC Health Check
  - Recommended by Microsoft
  - Only works with individual PCs
  - Impossible to centralise results
  - Not working on domain-joined devices



PC health at a glance

32 GB RAM

1000 GB SSD

3 years old

Introducing Windows 11

Let's check if this PC meets the system requirements.
If it does, you can get the free upgrade when it's available.

This PC meets Windows 11 requirements

Great news — Windows 11 is free and coming soon! Check device specifications for apps and features that exceed minimum system requirements and Windows 10 features that aren't available in Windows 11.

- This PC supports Secure Boot.
- TPM 2.0 enabled on this PC.
  TPM: TPM 2.0
- The processor is supported for Windows 11.
  Processor: Intel® Core™ i7-8700K CPU @ 3.70GHz
- There is at least 4 GB of system memory (RAM).
  System memory: 32 GB
- The system disk is 64 GB or larger.

esday 4:50 AM

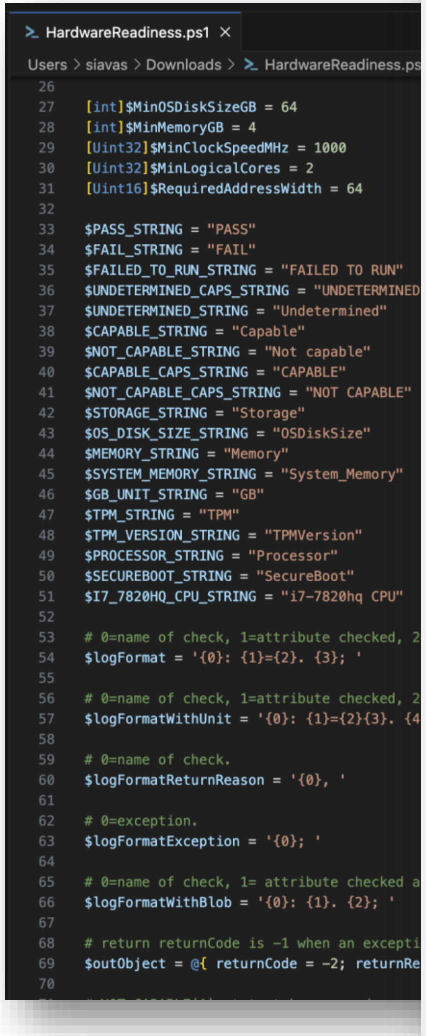
Storage capacity 33% full

Startup time See details

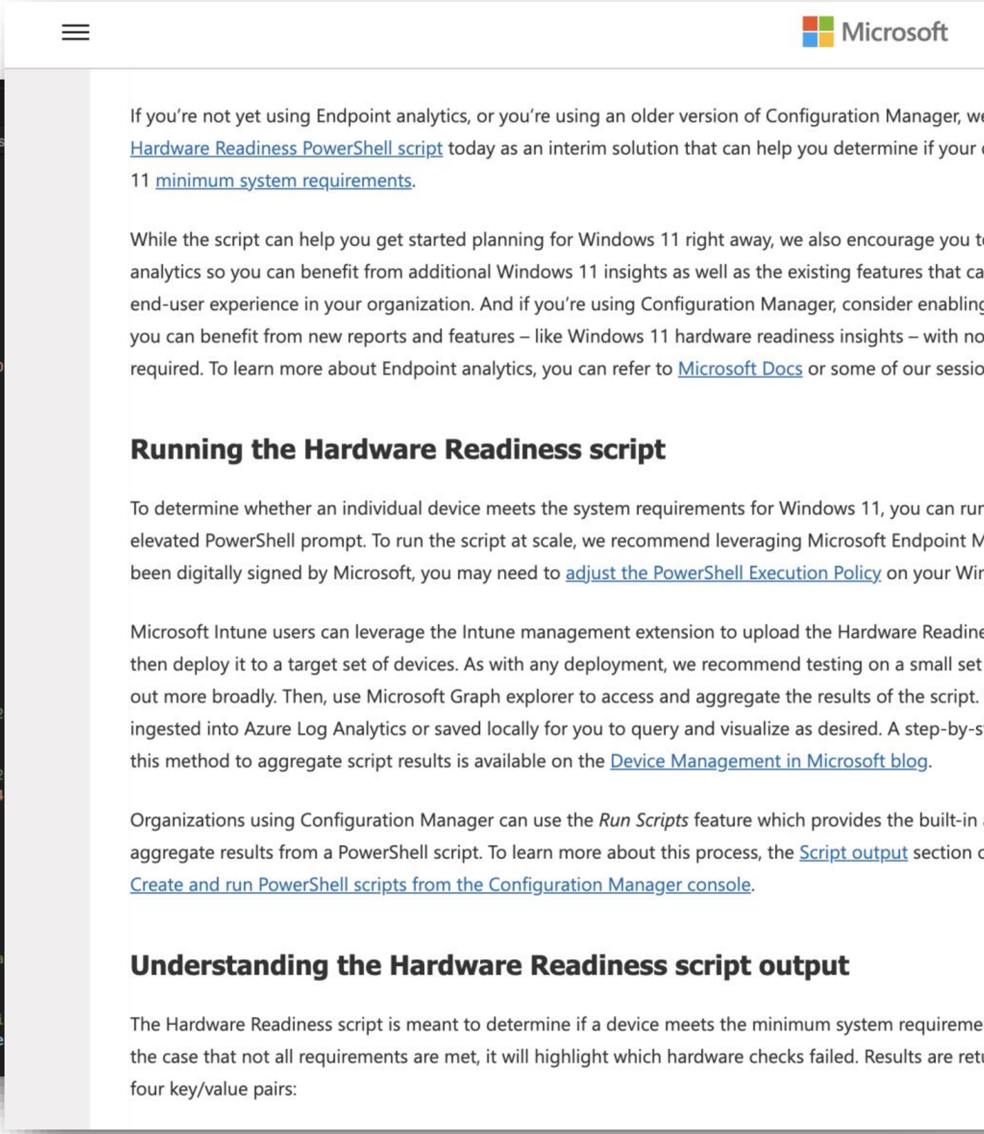
Related links

# Establishing devices compatibility 2/4

- Microsoft's PowerShell readiness script
  - Useful at first but became outdated quickly as Microsoft changed the list of supported CPUs over time.
  - Impossible to keep the supported list of CPUs updated automatically, the script is not dynamic



```
[int]$MinOSDiskSizeGB = 64
[int]$MinMemoryGB = 4
[Uint32]$MinClockSpeedMHz = 1000
[Uint32]$MinLogicalCores = 2
[Uint16]$RequiredAddressWidth = 64

$PASS_STRING = "PASS"
$FAIL_STRING = "FAIL"
$FAILED_TO_RUN_STRING = "FAILED TO RUN"
$UNDETERMINED_CAPS_STRING = "UNDETERMINED
$UNDETERMINED_STRING = "Undetermined"
$CAPABLE_STRING = "Capable"
$NOT_CAPABLE_STRING = "Not capable"
$CAPABLE_CAPS_STRING = "CAPABLE"
$NOT_CAPABLE_CAPS_STRING = "NOT CAPABLE"
$STORAGE_STRING = "Storage"
$OS_DISK_SIZE_STRING = "OSDiskSize"
$MEMORY_STRING = "Memory"
$SYSTEM_MEMORY_STRING = "System_Memory"
$GB_UNIT_STRING = "GB"
$TPM_STRING = "TPM"
$TPM_VERSION_STRING = "TPMVersion"
$PROCESSOR_STRING = "Processor"
$SECUREBOOT_STRING = "SecureBoot"
$I7_7820HQ_CPU_STRING = "i7-7820hq CPU"

# 0=name of check, 1=attribute checked, 2
$logFormat = '{0}: {1}={2}. {3}; '

# 0=name of check, 1=attribute checked, 2
$logFormatWithUnit = '{0}: {1}={2}{3}. {4

# 0=name of check.
$logFormatReturnReason = '{0}, '

# 0=exception.
$logFormatException = '{0}; '

# 0=name of check, 1= attribute checked a
$logFormatWithBlob = '{0}: {1}. {2}; '

# return returnCode is -1 when an excepti
$outObject = @{ returnCode = -2; returnRe

```



If you're not yet using Endpoint analytics, or you're using an older version of Configuration Manager, we
Hardware Readiness PowerShell script today as an interim solution that can help you determine if your
11 minimum system requirements.

While the script can help you get started planning for Windows 11 right away, we also encourage you t
analytics so you can benefit from additional Windows 11 insights as well as the existing features that ca
end-user experience in your organization. And if you're using Configuration Manager, consider enabling
you can benefit from new reports and features – like Windows 11 hardware readiness insights – with no
required. To learn more about Endpoint analytics, you can refer to Microsoft Docs or some of our sessio

## Running the Hardware Readiness script

To determine whether an individual device meets the system requirements for Windows 11, you can run
elevated PowerShell prompt. To run the script at scale, we recommend leveraging Microsoft Endpoint M
been digitally signed by Microsoft, you may need to adjust the PowerShell Execution Policy on your Win

Microsoft Intune users can leverage the Intune management extension to upload the Hardware Readine
then deploy it to a target set of devices. As with any deployment, we recommend testing on a small set
out more broadly. Then, use Microsoft Graph explorer to access and aggregate the results of the script.
ingested into Azure Log Analytics or saved locally for you to query and visualize as desired. A step-by-s
this method to aggregate script results is available on the Device Management in Microsoft blog.

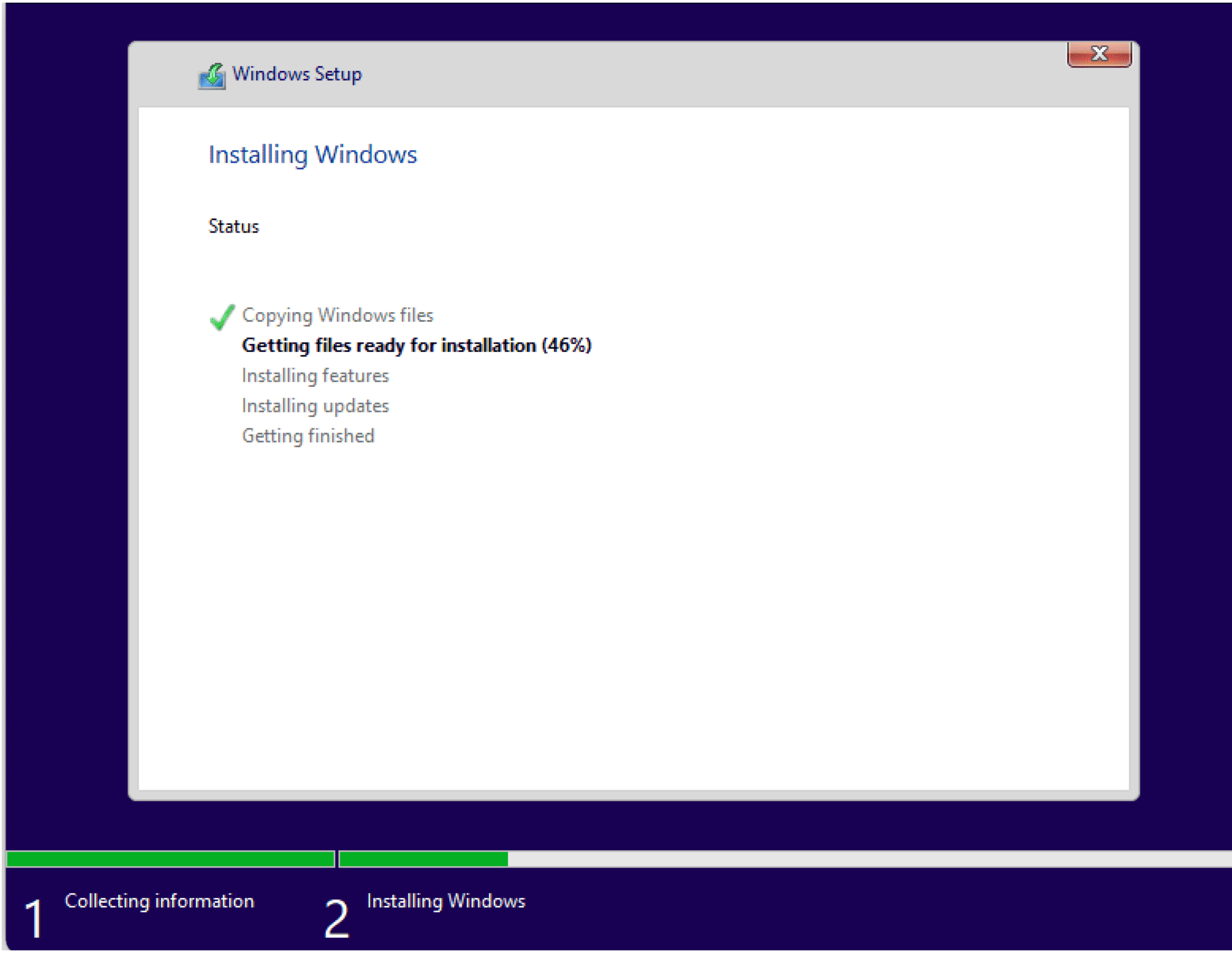
Organizations using Configuration Manager can use the *Run Scripts* feature which provides the built-in
aggregate results from a PowerShell script. To learn more about this process, the Script output section o
Create and run PowerShell scripts from the Configuration Manager console.

## Understanding the Hardware Readiness script output

The Hardware Readiness script is meant to determine if a device meets the minimum system requireme
the case that not all requirements are met, it will highlight which hardware checks failed. Results are retu
four key/value pairs:

# Establishing devices compatibility 3/4

- Windows Setup as a compatibility checker
  - The Windows Setup executable has a special parameter for that (/compat)
  - Advantage: Obsolescence of the PowerShell script is solved
  - Cons: Process hanging and not yielding any results from time to time



Windows Setup

Installing Windows

Status

✓ Copying Windows files

**Getting files ready for installation (46%)**

Installing features

Installing updates

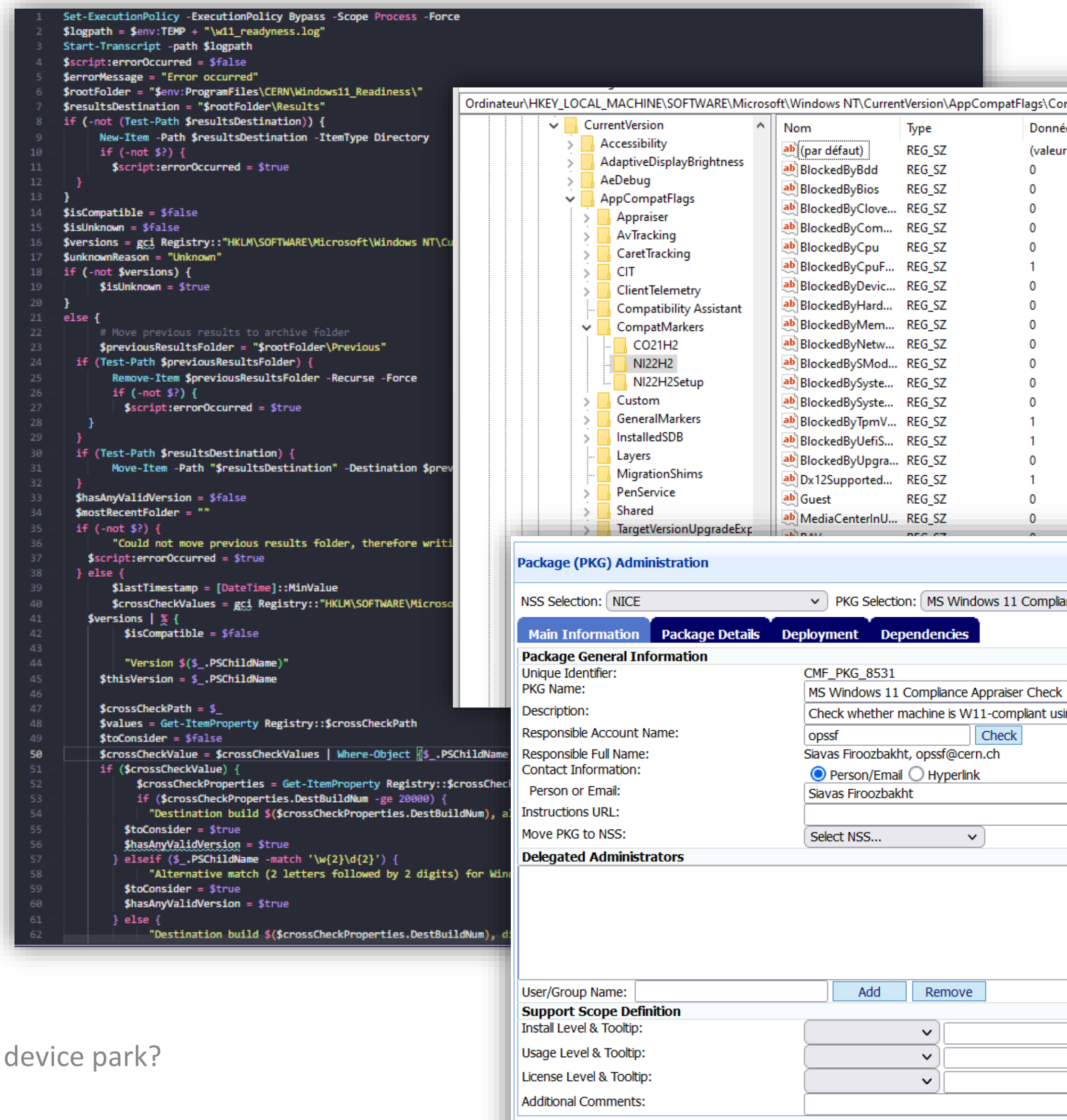
Getting finished

1 Collecting information

2 Installing Windows

# Establishing device compatibility 4/4

- Windows internal checker (Appraiser)
  - Advantage: dynamically updated by Windows
  - Cons: not officially documented by Microsoft
  - Final choice: reliable results for 94% of our Windows device park



```
Set-ExecutionPolicy -ExecutionPolicy Bypass -Scope Process -Force
$logpath = $env:TEMP + "\w11_readyness.log"
Start-Transcript -path $logpath
$script:errorOccurred = $false
$errorMessage = "Error occurred"
$rootFolder = "$env:ProgramFiles\CERN\Windows11_Readiness\"
$resultsDestination = "$rootFolder\Results"
if (-not (Test-Path $resultsDestination)) {
   New-Item -Path $resultsDestination -ItemType Directory
   if (-not $?) {
    $script:errorOccurred = $true
 }
}
$isCompatible = $false
$isUnknown = $false
$versions = gci Registry::"HKLM\SOFTWARE\Microsoft\Windows NT\Cu
$unknownReason = "Unknown"
if (-not $versions) {
   $isUnknown = $true
}
else {
   # Move previous results to archive folder
   $previousResultsFolder = "$rootFolder\Previous"
 if (Test-Path $previousResultsFolder) {
    Remove-Item $previousResultsFolder -Recurse -Force
    if (-not $?) {
     $script:errorOccurred = $true
  }
 }
 if (Test-Path $resultsDestination) {
    Move-Item -Path "$resultsDestination" -Destination $prev
 }
 $hasAnyValidVersion = $false
 $mostRecentFolder = ""
 if (-not $?) {
    "Could not move previous results folder, therefore writi
  $script:errorOccurred = $true
 } else {
    $lastTimestamp = [DateTime]::MinValue
    $crossCheckValues = gci Registry::"HKLM\SOFTWARE\Microso
  $versions | % {
     $isCompatible = $false

     "Version $($_.PSChildName)"
   $thisVersion = $_.PSChildName

   $crossCheckPath = $_
   $values = Get-ItemProperty Registry::$crossCheckPath
   $toConsider = $false
   $crossCheckValue = $crossCheckValues | Where-Object {$_.PSChildName
   if ($crossCheckValue) {
      $crossCheckProperties = Get-ItemProperty Registry::$crossCheck
      if ($crossCheckProperties.DestBuildNum -ge 20000) {
       "Destination build $($crossCheckProperties.DestBuildNum), a
     $toConsider = $true
     $hasAnyValidVersion = $true
    } elseif ($_.PSChildName -match '\w{2}\d{2}') {
       "Alternative match (2 letters followed by 2 digits) for Win
     $toConsider = $true
     $hasAnyValidVersion = $true
    } else {
       "Destination build $($crossCheckProperties.DestBuildNum), d
```

Ordinateur\HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\AppCompatFlags\Co

```
CurrentVersion
  Accessibility
  AdaptiveDisplayBrightness
  AeDebug
  AppCompatFlags
    Appraiser
    AvTracking
    CaretTracking
    CIT
    ClientTelemetry
    Compatibility Assistant
    CompatMarkers
      CO21H2
      NI22H2
      NI22H2Setup
    Custom
    GeneralMarkers
    InstalledSDB
    Layers
    MigrationShims
    PenService
    Shared
    TargetVersionUpgradeExp
```

| Nom | Type | Donné |
|---|---|---|
| (par défaut) | REG_SZ | (valeur |
| BlockedByBdd | REG_SZ | 0 |
| BlockedByBios | REG_SZ | 0 |
| BlockedByClove... | REG_SZ | 0 |
| BlockedByCom... | REG_SZ | 0 |
| BlockedByCpu | REG_SZ | 0 |
| BlockedByCpuF... | REG_SZ | 1 |
| BlockedByDevic... | REG_SZ | 0 |
| BlockedByHard... | REG_SZ | 0 |
| BlockedByMem... | REG_SZ | 0 |
| BlockedByNetw... | REG_SZ | 0 |
| BlockedBySMod... | REG_SZ | 0 |
| BlockedBySyste... | REG_SZ | 0 |
| BlockedBySyste... | REG_SZ | 0 |
| BlockedByTpmV... | REG_SZ | 1 |
| BlockedByUefiS... | REG_SZ | 1 |
| BlockedByUpgra... | REG_SZ | 0 |
| Dx12Supported... | REG_SZ | 1 |
| Guest | REG_SZ | 0 |
| MediaCenterInU... | REG_SZ | 0 |

**Package (PKG) Administration**

NSS Selection: NICE PKG Selection: MS Windows 11 Complia

**Package General Information**

Unique Identifier: CMF_PKG_8531
PKG Name: MS Windows 11 Compliance Appraiser Check
Description: Check whether machine is W11-compliant usi
Responsible Account Name: opssf Check
Responsible Full Name: Siavas Firoozbakht, opssf@cern.ch
Contact Information: ● Person/Email ○ Hyperlink
Person or Email: Siavas Firoozbakht
Instructions URL:
Move PKG to NSS: Select NSS...

**Delegated Administrators**

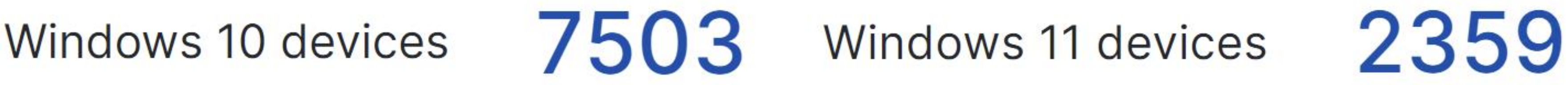
User/Group Name: Add Remove

**Support Scope Definition**

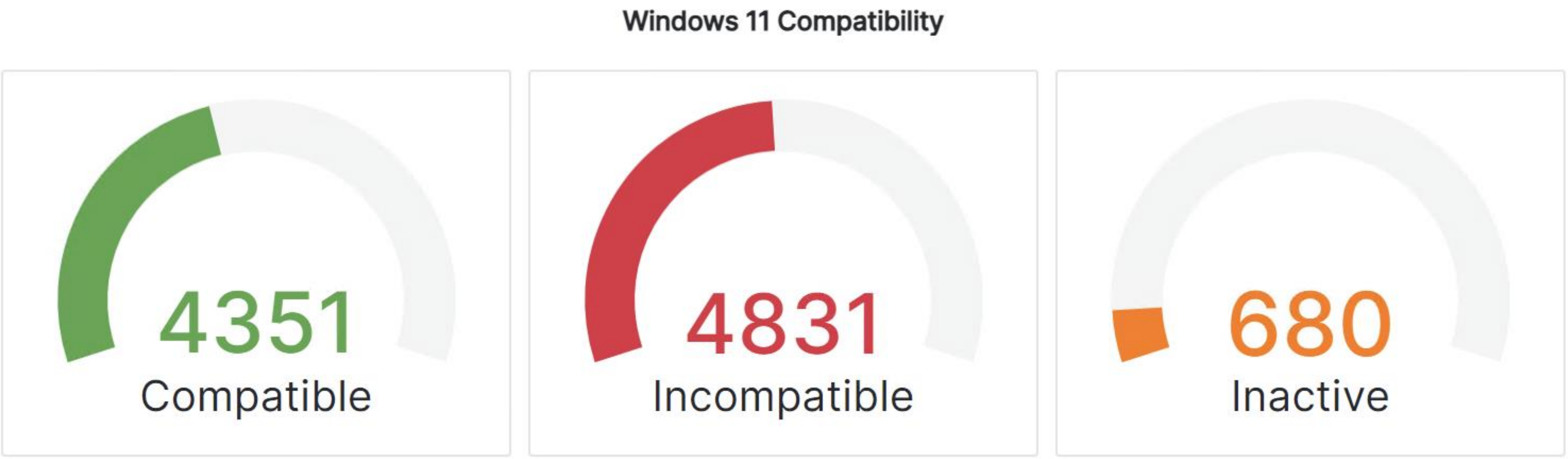
Install Level & Tooltip:
Usage Level & Tooltip:
License Level & Tooltip:
Additional Comments:

# Device compatibility

- Approximately 10000 desktops in total are CERN-managed
- 4831 of which are not compatible with Windows 11
  - 3906 are physical devices, 925 are OpenStack VMs in the CERN Cloud



Windows 10 devices 7503 Windows 11 devices 2359



Windows 11 Compatibility

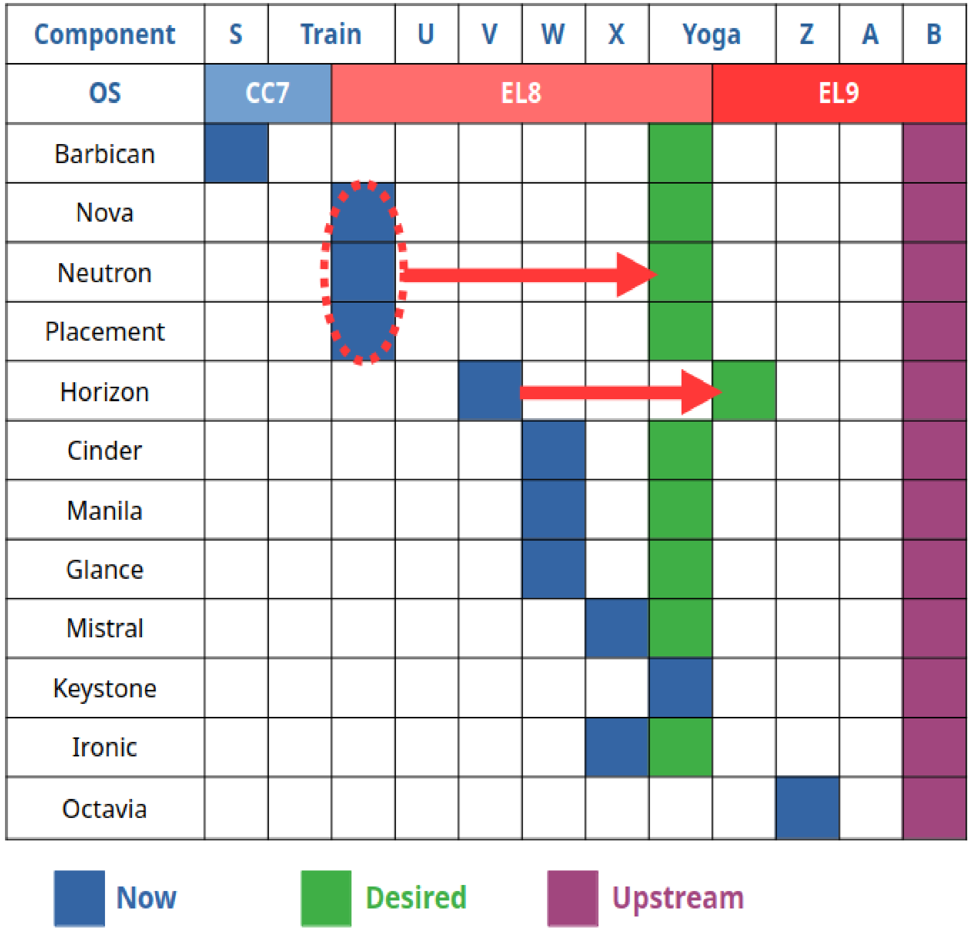
4351 Compatible

4831 Incompatible

680 Inactive

# Migration mechanics – OpenStack VMs

- Windows 11 requires TPM 2.0 and a compatible CPU (>= Intel Cascade Lake) which in CERN OpenStack translates to:
  - Upgrading from Train (T) to Yoga (Y) to enable vTPM support on compatible hardware
  - Hypervisor upgrade (cc7 to el8)
- Windows 11 VMs can now be installed in CERN OpenStack
- Limitation: vTPM cannot be added on existing VMs
  - As a physical device attached to a VM, it prevents some operations like live-migrations and rebuild
  - Existing Windows 10 instances cannot be upgraded in-place to Windows 11

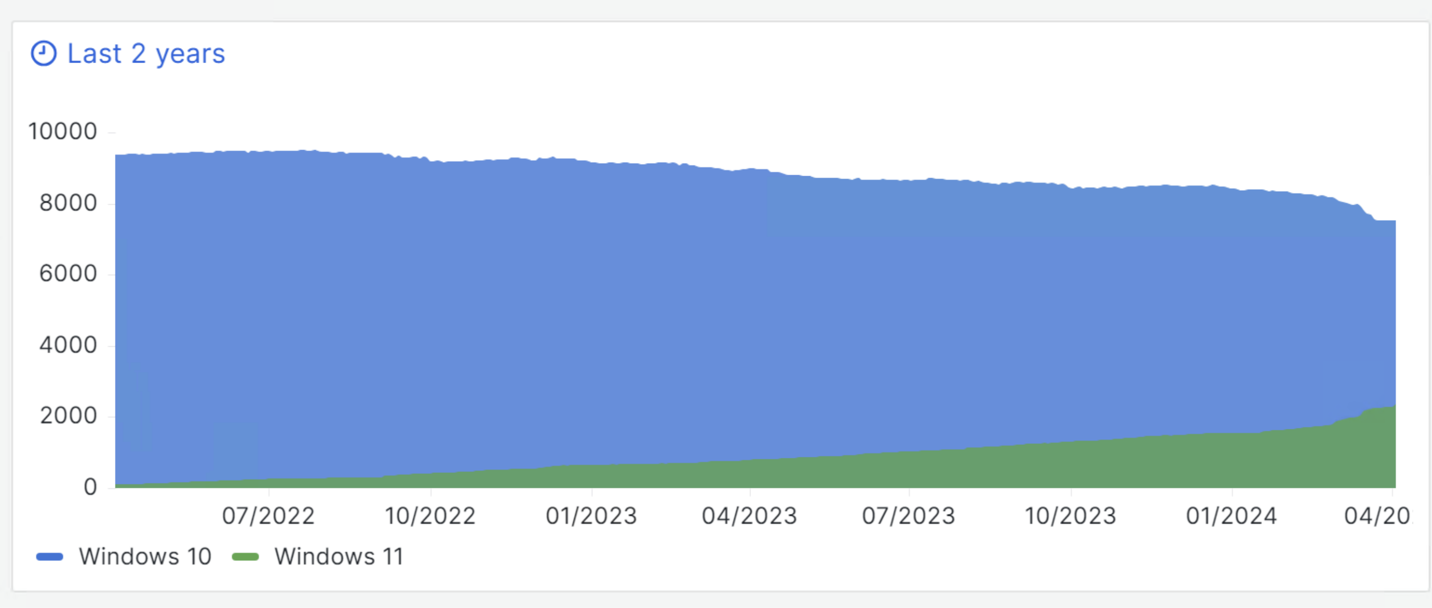


| Component | S | Train | | U | V | W | X | Yoga | | Z | A | B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OS | CC7 | | EL8 | | | | | | EL9 | | | |
| Barbican | 🟦 | | | | | | | 🟩 | | | | 🟪 |
| Nova | | | 🟦 | | | | | 🟩 | | | | 🟪 |
| Neutron | | | 🟦 | | | | | 🟩 | | | | 🟪 |
| Placement | | | 🟦 | | | | | 🟩 | | | | 🟪 |
| Horizon | | | | | 🟦 | | | | 🟩 | | | 🟪 |
| Cinder | | | | | | 🟦 | | 🟩 | | | | 🟪 |
| Manila | | | | | | 🟦 | | 🟩 | | | | 🟪 |
| Glance | | | | | | 🟦 | | 🟩 | | | | 🟪 |
| Mistral | | | | | | | 🟦 | 🟩 | | | | 🟪 |
| Keystone | | | | | | | | 🟦 | | | | 🟪 |
| Ironic | | | | | | | 🟦 | 🟩 | | | | 🟪 |
| Octavia | | | | | | | | | | 🟦 | | 🟪 |

🟦 Now 🟩 Desired 🟪 Upstream

# Migration mechanics – Physical devices

- Deployment via an in-place upgrade package in CMF with a tailored schedule over the first 6 months of 2024
- Windows 11 has been proposed by Windows Updates automatically but would not be forced by MS until Windows 10 reach EOL (October 2025)



# Migration mechanics – Physical devices

- An in-place upgrade is not possible when the original OS language is different from the OS language of the upgrade package.
  - Impossible to install our proposed English International (UK) version on English US systems.
  - Solution: We remotely deployed and installed the language pack and changed the OS language on concerned systems prior to Windows 11 upgrade.
- An in-place upgrade is not possible even with more than 20 GB of free disk
  - Microsoft recommend at least 20 GB of free disk space in the official specifications, but sometimes up to 37 GB is requested.
  - Solution: We implemented additional checks in the Windows package to ensure the system will have enough disk space to perform the upgrade after the setup is launched

# Software compatibility

- The version of one of our main CAD software is currently not compatible with Windows 11
  - Impossible to migrate to Windows 11 until a compatible version has been deployed
  - Mitigation: Additional dependencies in the CMF package to ensure migration is on hold until required version of the given software has been deployed
  - Solution: engage with the CAD software support to establish a feasible migration timeline
- New Windows 11 security features interfere with software widely used at CERN
  - Concretely: Credential delegation in PuTTY and StarNet X-Win32 does not work with Credentials Guard (a feature of Virtual Based Security on Windows 11), which allows isolation of secrets such that only privileged system software can access them.
  - Workaround for Putty: disable credential delegation
  - Solution for X-Win32: in preparation, feature request has been accepted by StarNet
  - More information on Credential Guard and Virtual Based Security: https://learn.microsoft.com/en-us/windows/security/identity-protection/credential-guard/

# Data Privacy with Microsoft Copilot

- Copilot brand is used for a dynamic family of ChatGPT-like products that leverage the same LLM models (GPT-3, GPT-4 Turbo)
- Microsoft is aggressively extending the Copilot brand to a wide range of products, both old and new
- Previous “Bing Chat Enterprise” (free of charge) is now ”Microsoft Copilot”
  - Offers new feature for enterprise data privacy called ”Commercial data protection”
  - Is a likely replacement for Cortana, the previous Windows assistant, whose standalone app was discontinued in June 2023.
  - Is increasingly integrated with the operating system
- Not to be confused with:
  - Copilot Pro
  - Copilot for Microsoft 365
  - GitHub Copilot, Copilot Studio, etc.

# Clarifying Copilot confusion

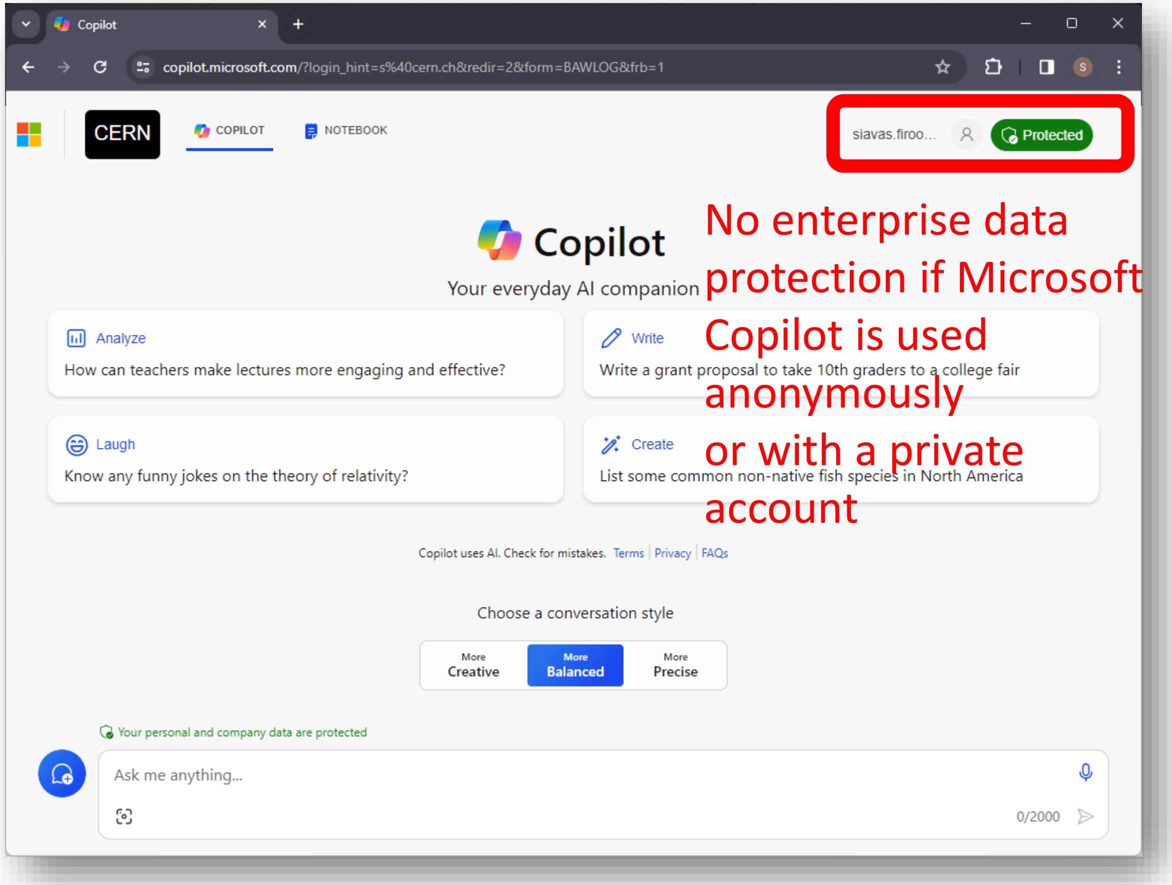
| Personal account | Work account |
|---|---|
| Copilot<br>*Free of charge* (previously Bing Chat)<br>*Can also be used anonymously (limited)* | Copilot<br>*optionally with Commercial data protection*<br>*Included in A1/A5* |
| ~~Copilot PRO~~<br>~~*$22/user/month*~~ | ~~Copilot for Microsoft 365~~<br>~~*A5 + $30/user/month*~~ |

Out of scope

# Data Privacy with Microsoft Copilot

When the user is logged on with an account that has an A1/A5 licence item “Commercial data protection for Microsoft Copilot” enabled:

- The free of charge Microsoft Copilot*) does not access or use any organisational data other than the one directly provided in the chat as prompts. Organisation and user information is removed from the chat data at the start of a session.
- None of the data provided is used to train the underlying LLM model
- Sessions are temporary and cannot be saved. The session is closed when the browser tab is closed or when the current login times out. Chat history is not available.
- Advertising in Entra ID is not based on chat history. In Copilot, however, advertisements pertinent to the chat session may be shown.
- No usage reports and auditing are available to administrators of the Organisation
- The data that is collected from prompts and responses lives as long as the session.
- To provide chat responses, Copilot uses global data centres for processing and may process data in the United States. Optional Bing-backed connected experiences don't fall under Microsoft's EU Data Boundary (EUDB) commitment.



copilot.microsoft.com/?login_hint=s%40cern.ch&redir=2&form=BAWLOG&frb=1

Your everyday AI companion

How can teachers make lectures more engaging and effective?

Write a grant proposal to take 10th graders to a college fair

Know any funny jokes on the theory of relativity?

List some common non-native fish species in North America

Copilot uses AI. Check for mistakes. Terms | Privacy | FAQs

Choose a conversation style

Your personal and company data are protected

Ask me anything...

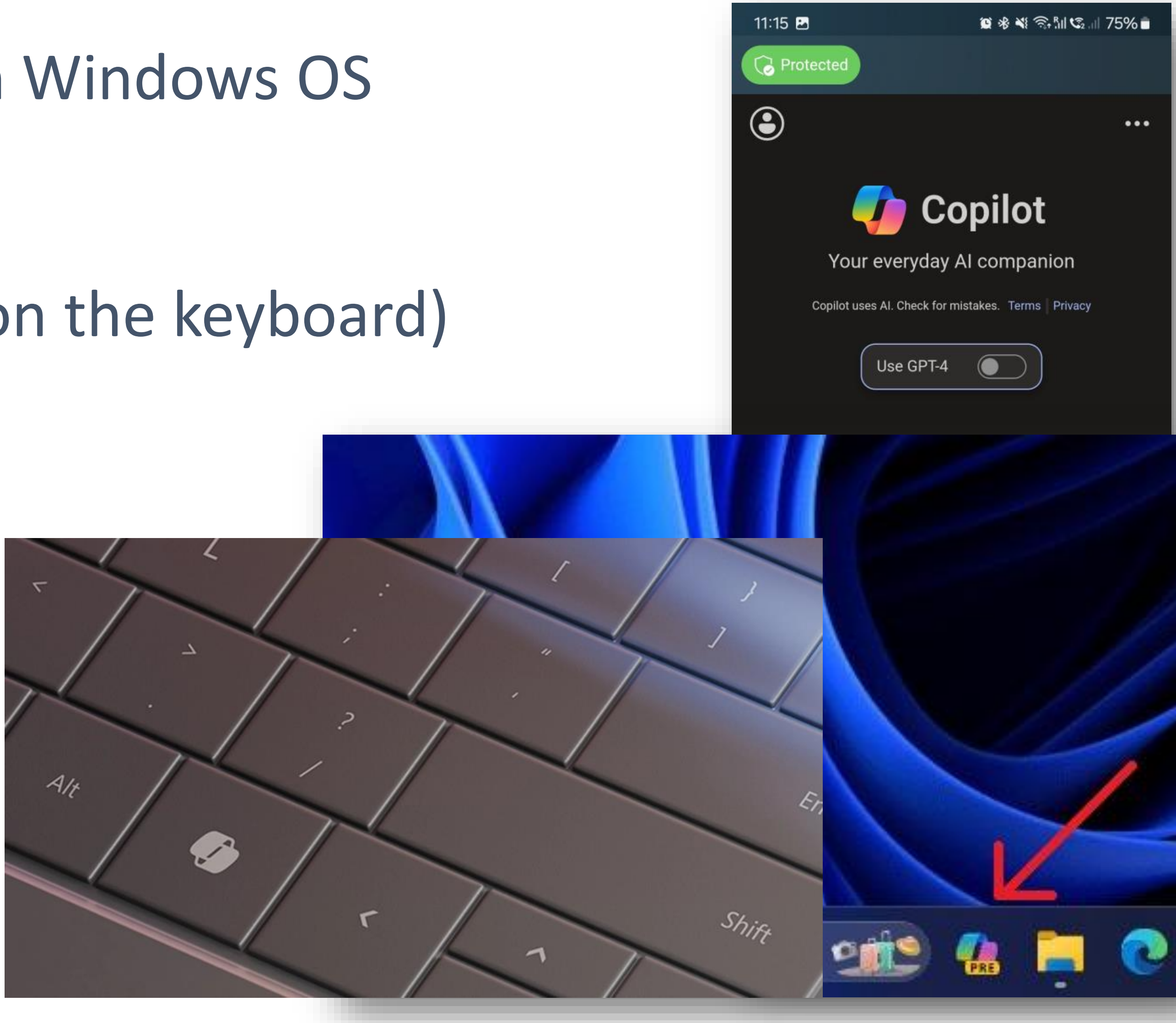
0/2000

No enterprise data protection if Microsoft Copilot is used anonymously or with a private account

*) Other Copilot flavours have different data privacy challanges, out of scope of this talk

# Data Privacy with Microsoft Copilot

- We expect Copilot to be integrated in Windows OS in the future
  - Foreseen for Windows 11 24H2 in Fall 2024
- Also, in PC hardware (dedicated key on the keyboard)
- Our intention is to enable it in a way that ensures appropriate data privacy
  - M365 A1/A5 licences
  - GPOs



11:15 75%

Protected

Copilot

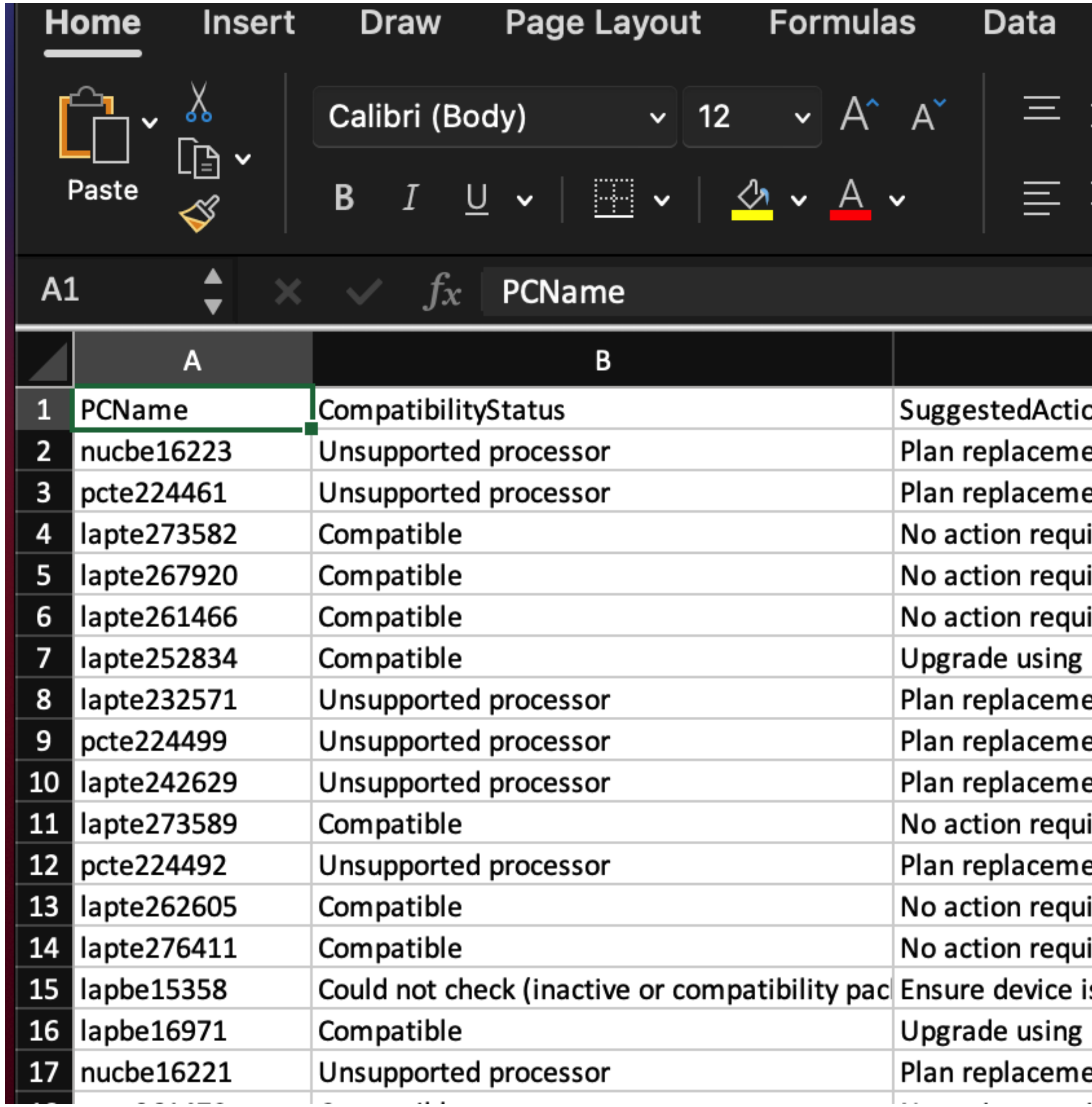
Your everyday AI companion

Copilot uses AI. Check for mistakes. Terms | Privacy

Use GPT-4

# Migration planning

- At CERN, endpoint device purchasing is done per administrative units/experiments and there is no central purchasing plan
- Communication around the migration started 2 years before the end-of-support date and includes:
  - Presentations to the IT representatives of user communities
  - Providing of up-to-date data regarding device compatibility in each department
  - Technical help to dedicated support teams
  - Monitoring the evolution of the migration across CERN user communities and follow-up with their representatives



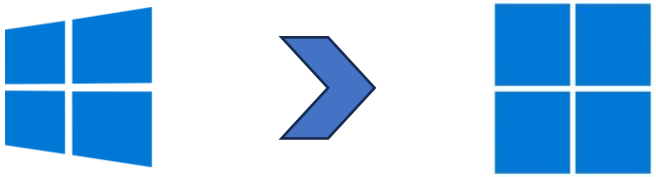
| | A | B | |
|---|---|---|---|
| 1 | PCName | CompatibilityStatus | SuggestedActic |
| 2 | nucbe16223 | Unsupported processor | Plan replaceme |
| 3 | pcte224461 | Unsupported processor | Plan replaceme |
| 4 | lapte273582 | Compatible | No action requi |
| 5 | lapte267920 | Compatible | No action requi |
| 6 | lapte261466 | Compatible | No action requi |
| 7 | lapte252834 | Compatible | Upgrade using |
| 8 | lapte232571 | Unsupported processor | Plan replaceme |
| 9 | pcte224499 | Unsupported processor | Plan replaceme |
| 10 | lapte242629 | Unsupported processor | Plan replaceme |
| 11 | lapte273589 | Compatible | No action requi |
| 12 | pcte224492 | Unsupported processor | Plan replaceme |
| 13 | lapte262605 | Compatible | No action requi |
| 14 | lapte276411 | Compatible | No action requi |
| 15 | lapbe15358 | Could not check (inactive or compatibility pac | Ensure device i |
| 16 | lapbe16971 | Compatible | Upgrade using |
| 17 | nucbe16221 | Unsupported processor | Plan replaceme |

# And what if you cannot migrate?

- Extensive discussions with Microsoft have not been promising so far
  - Microsoft would not change hardware compatibility criteria
  - 8th Generation processor remains the minimum
  - Proposed alternative was to move end-user devices to the (Microsoft) cloud and replace current devices with thin clients
- Possible alternatives
  - Consolidation: workloads from multiple devices combined into small number of newer devices COST—
  - Recycling: devices could be used with another OS, ex.: Alma Linux or RHEL9
    - Devices produced after 2014 support x86_64-v2 architecture which is the requirement for RHEL9 COST—
    - The cost of user training may be higher than the cost of replacing the hardware COST++
  - Switching to Windows Server OS for specific workstations where supported COST+
    - For engineering workstations where hardware is planned to be replaced in 2-3 years
  - In specific scenarios, switching to Windows 10 Ent. LTSC or IoT LTSC (supported until 2027/29) COST++
    - Only to be considered for computers where licenced software requires running Windows 10 (e.g., workstations with engineering software or control equipment).
  - Migrating to the latest build of Windows 11 late in 2025 overriding HW requirements COST—
    - To extend HW lifetime by up to 12 months, assuming possible with W11b24H2 (TBC when released)

# To conclude :

- Windows 10 end-of-life is 23 October 2025
- Plan and communicate early
  - despite uncertainty caused by evolving HW requirements
  - it makes budget planning easier
- Identifying (in)compatible devices may be a challenge
- Consider data-privacy impact of Copilot
- All alternatives to replacing old hardware come with its own cost
- It is an opportunity to consolidate your device park



Questions? Thoughts? Your own experience?

Thank you for your attention !

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