

Projet de Monitoring Local avec Prometheus, Windows Exporter et Grafana

1. Introduction

L'objectif de ce projet est de mettre en place une solution de supervision locale pour suivre les ressources système de mon PC personnel. Grâce à l'installation de **Prometheus**, **Windows Exporter** et **Grafana**, j'ai pu collecter, visualiser et surveiller en temps réel les métriques de base telles que le **CPU**, la **mémoire vive** et l'utilisation du **disque**.

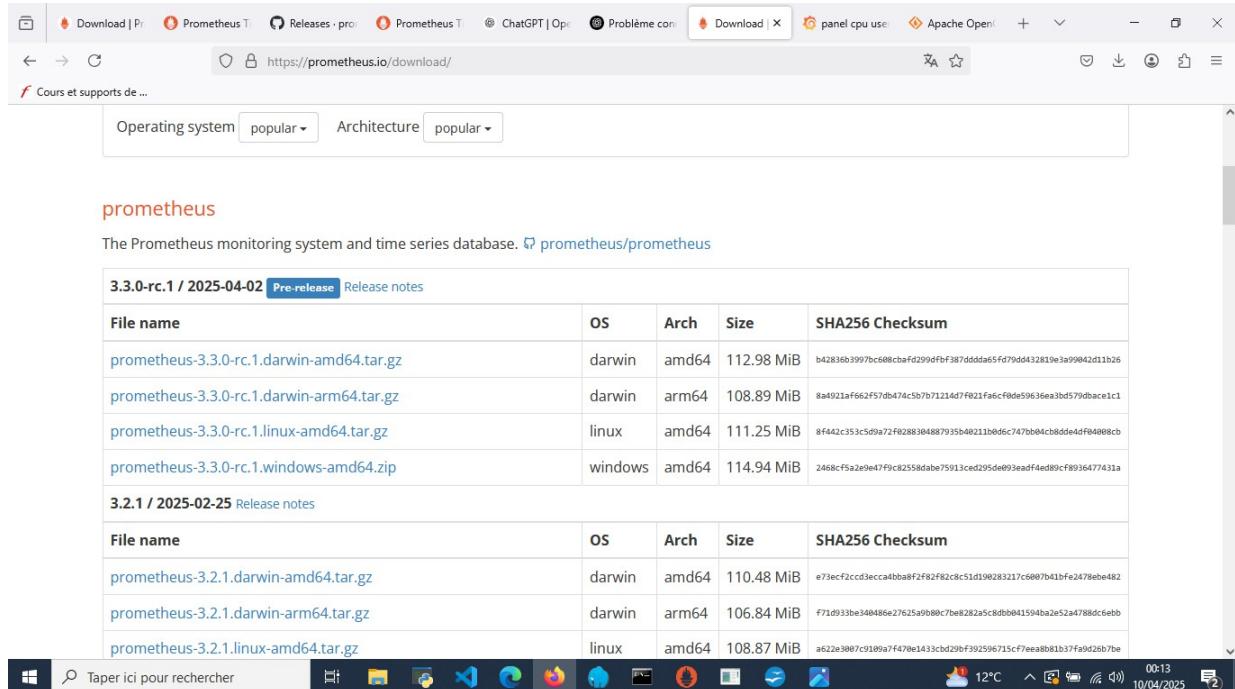
2. Environnement de travail

- **Système d'exploitation** : Windows 10 / 11
- **Outils utilisés** :
 - Prometheus
 - Windows Exporter
 - Grafana
- **Type d'installation** : locale (tout fonctionne sur ma propre machine)

3. Installation et configuration

3.1 Installation de Prometheus

1. Téléchargement depuis le site officiel : <https://prometheus.io>



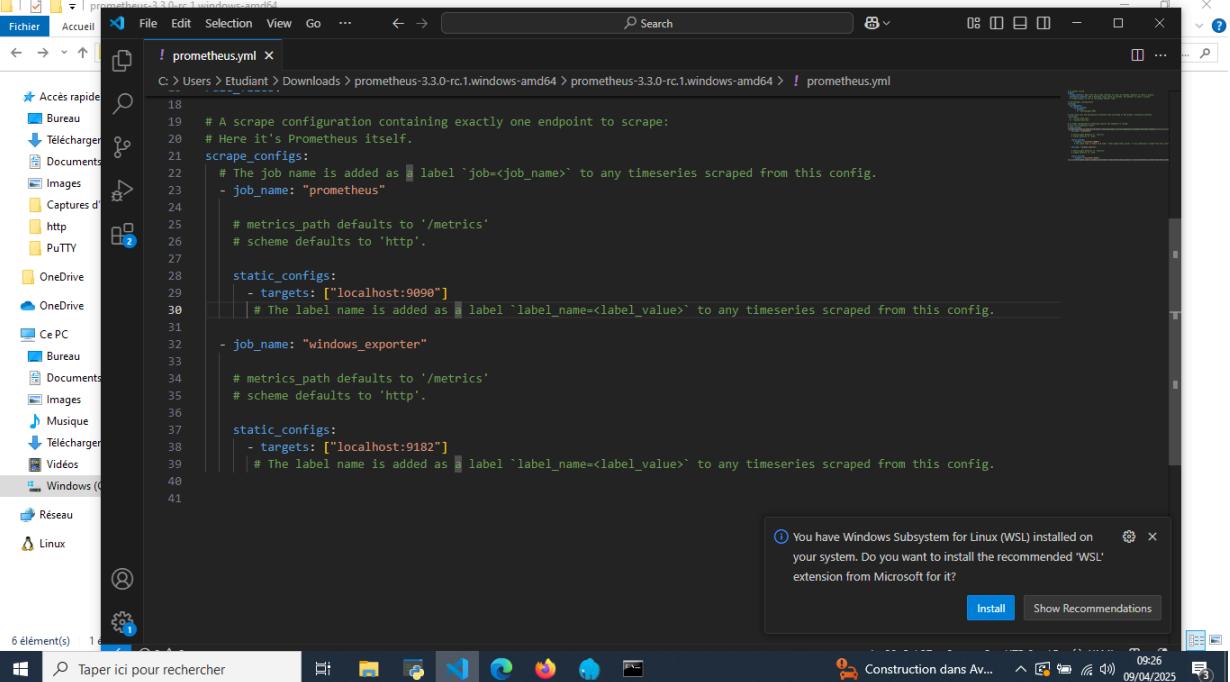
The screenshot shows a Microsoft Edge browser window with the URL <https://prometheus.io/download/> in the address bar. The page displays the Prometheus monitoring system and time series database. It features two main sections: "3.3.0-rc.1 / 2025-04-02 Pre-release Release notes" and "3.2.1 / 2025-02-25 Release notes". Each section contains a table with columns for File name, OS, Arch, Size, and SHA256 Checksum. The tables list various pre-built binary packages for different operating systems and architectures.

File name	OS	Arch	Size	SHA256 Checksum
prometheus-3.3.0-rc.1.darwin-amd64.tar.gz	darwin	amd64	112.98 MiB	b42836b3997bc608cbaf299dfb387ddda65fd79dd432819e3a99842d11b26
prometheus-3.3.0-rc.1.darwin-arm64.tar.gz	darwin	arm64	108.89 MiB	8a4021af662f57db474c5b7b1214d7f021fa6cf0de59636ea3bd579dbace1c1
prometheus-3.3.0-rc.1.linux-amd64.tar.gz	linux	amd64	111.25 MiB	8f442c353c5d9a72f0288304887935b48221b066c747bb04cb8dde4df04008cb
prometheus-3.3.0-rc.1.windows-amd64.zip	windows	amd64	114.94 MiB	2468cf5a2e9e479c82558dabe75913ced195de093eadf4ed80cf8936477431a

File name	OS	Arch	Size	SHA256 Checksum
prometheus-3.2.1.darwin-amd64.tar.gz	darwin	amd64	110.48 MiB	e73ecf2cc3ecc4bba8f2f82f82c8c51d19e283217c5007b41fe2478eb482
prometheus-3.2.1.darwin-arm64.tar.gz	darwin	arm64	106.84 MiB	f710933be340486e276259b88c7be822a5c8dbb641594ba2e52a4788dc6ebb
prometheus-3.2.1.linux-amd64.tar.gz	linux	amd64	108.87 MiB	a622e3087c9109a7f470e1433cb20bf392596715cf7eeab81b57fa0d28b7be

2. Extraction de l'archive dans un dossier C:\Prometheus

3. Configuration du fichier prometheus.yml :



```
C:\> Users > Etudiant > Downloads > prometheus-3.3.0-rc.1.windows-amd64 > prometheus-3.3.0-rc.1.windows-amd64 > prometheus.yml

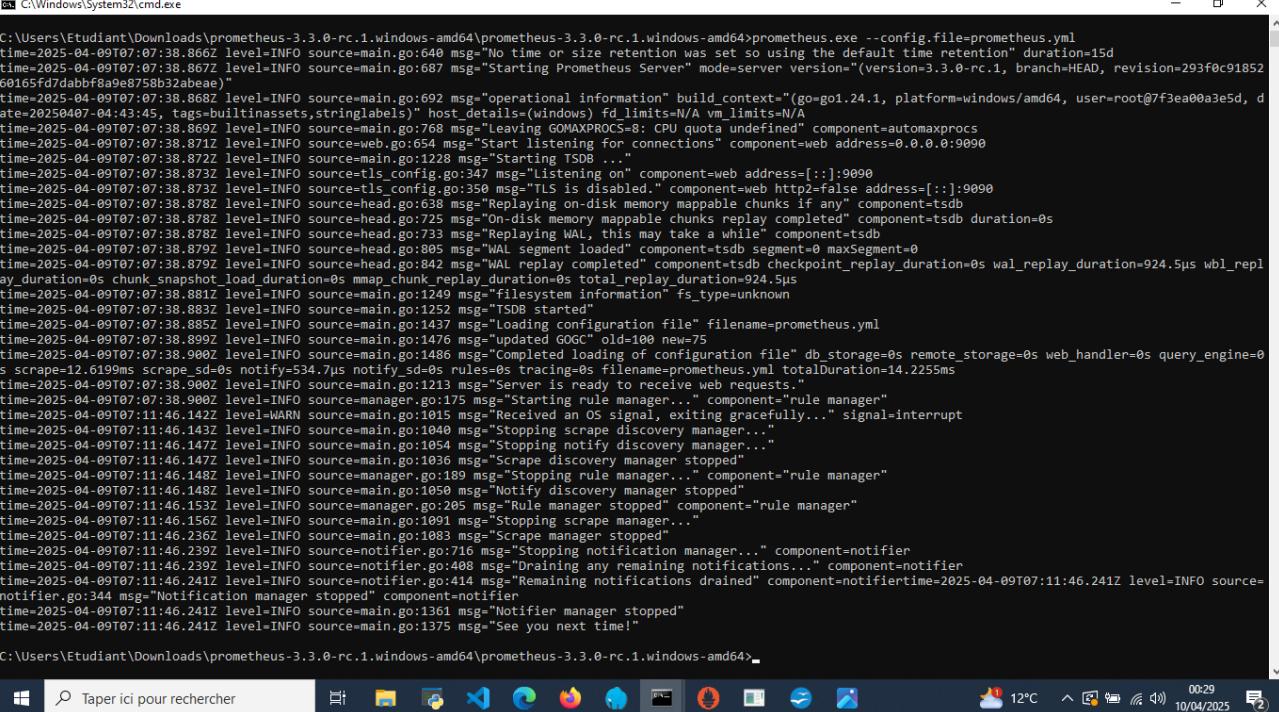
18
19 # A scrape configuration containing exactly one endpoint to scrape:
20 # Here it's Prometheus itself.
21 scrape_configs:
22   # The job name is added as a label `job=<job_name>` to any timeseries scraped from this config.
23   - job_name: "prometheus"
24
25     # metrics_path defaults to '/metrics'
26     # scheme defaults to 'http'.
27
28   static_configs:
29     - targets: ["localhost:9090"]
30       # The label name is added as a label `label_name=<label_value>` to any timeseries scraped from this config.
31
32   - job_name: "windows_exporter"
33
34     # metrics_path defaults to '/metrics'
35     # scheme defaults to 'http'.
36
37   static_configs:
38     - targets: ["localhost:9182"]
39       # The label name is added as a label `label_name=<label_value>` to any timeseries scraped from this config.
40
41
```

You have Windows Subsystem for Linux (WSL) installed on your system. Do you want to install the recommended 'WSL' extension from Microsoft for it?

Install Show Recommendations

4. Lancement avec la commande :

```
prometheus.exe --config.file=prometheus.yml
```



```
C:\Users\Etudiant\Downloads\prometheus-3.3.0-rc.1.windows-amd64\prometheus-3.3.0-rc.1.windows-amd64>prometheus.exe --config.file=prometheus.yml
time=2025-04-09T07:07:38.866Z level=INFO source=main.go:640 msg="No time or size retention was set so using the default time retention" duration=15d
time=2025-04-09T07:07:38.867Z level=INFO source=main.go:687 msg="Starting Prometheus Server" mode=server version="(version=3.3.0-rc.1, branch=HEAD, revision=293f0c9185260165fd7dabbfb8a9e8758b32abae)"
time=2025-04-09T07:07:38.868Z level=INFO source=main.go:692 msg="operational information" build_context="(go=go1.24.1, platform=windows/amd64, user=root@7f3ea00a3e5d, date=2025-04-09T07:04:43:45, tags=builtnassets,stringslabels)" host_details="(windows) fd_limits=N/A vm_limits=N/A"
time=2025-04-09T07:07:38.869Z level=INFO source=main.go:768 msg="Leaving GOMAXPROCS=8: CPU quota undefined" component=autamaxprocs
time=2025-04-09T07:07:38.871Z level=INFO source=web.go:654 msg="Start listening for connections" component=web address=0.0.0.0:9090
time=2025-04-09T07:07:38.872Z level=INFO source=main.go:1228 msg="Starting TSDB ..."
time=2025-04-09T07:07:38.873Z level=INFO source=tls_config.go:347 msg="Listening on" component=web address=[::]:9090
time=2025-04-09T07:07:38.873Z level=INFO source=tls_config.go:350 msg="TLS is disabled." component=web http2=false address=[::]:9090
time=2025-04-09T07:07:38.878Z level=INFO source=head.go:638 msg="Replaying on-disk memory mappable chunks if any" component=tsdb
time=2025-04-09T07:07:38.879Z level=INFO source=head.go:725 msg="On-disk memory mappable chunks replay completed" component=tsdb duration=0s
time=2025-04-09T07:07:38.879Z level=INFO source=head.go:733 msg="Replaying WAL, this may take a while" component=tsdb
time=2025-04-09T07:07:38.879Z level=INFO source=head.go:805 msg="WA segment loaded" component=tsdb segment=0 maxSegment=0
time=2025-04-09T07:07:38.879Z level=INFO source=head.go:842 msg="WA replay completed" component=tsdb checkpoint_replay_duration=0s wal_replay_duration=924.5μs wbl_replay_duration=0s chunk_snapshot_load_duration=0s mmap_chunk_replay_duration=0s total_replay_duration=924.5μs
time=2025-04-09T07:07:38.881Z level=INFO source=main.go:1249 msg="filesystem information" fs_type=unknown
time=2025-04-09T07:07:38.883Z level=INFO source=main.go:1252 msg="TSDB started"
time=2025-04-09T07:07:38.885Z level=INFO source=main.go:1437 msg="Loading configuration file" filename=prometheus.yml
time=2025-04-09T07:07:38.889Z level=INFO source=main.go:1476 msg="Updated GOGC old=100 new=75
time=2025-04-09T07:07:38.900Z level=INFO source=main.go:1486 msg="Completed loading of configuration file" db_storage=0s remote_storage=0s web_handler=0s query_engine=0s
scrape=12.6199ms scrape_sd=0s notify=534.7μs notify_sd=0s rules=0 tracing=0s filename=prometheus.yml totalDuration=14.2255ms
time=2025-04-09T07:07:38.900Z level=INFO source=main.go:1213 msg="Server is ready to receive web requests."
time=2025-04-09T07:07:38.900Z level=INFO source=manager.go:175 msg="Starting rule manager..." component=rule manager
time=2025-04-09T07:07:38.900Z level=INFO source=manager.go:1015 msg="Received an OS signal, exiting gracefully..." signal=interrupt
time=2025-04-09T07:07:38.900Z level=INFO source=main.go:1437 msg="Stopping scrape discovery manager..."
time=2025-04-09T07:07:38.900Z level=INFO source=main.go:1040 msg="Stopping notify discovery manager..."
time=2025-04-09T07:07:38.900Z level=INFO source=main.go:1036 msg="Scrape discovery manager stopped"
time=2025-04-09T07:07:38.900Z level=INFO source=manager.go:189 msg="Stopping rule manager..." component=rule manager
time=2025-04-09T07:07:38.900Z level=INFO source=main.go:1050 msg="Notify discovery manager stopped"
time=2025-04-09T07:07:38.900Z level=INFO source=manager.go:205 msg="Rule manager stopped" component=rule manager
time=2025-04-09T07:07:38.900Z level=INFO source=main.go:1091 msg="Stopping scrape manager..."
time=2025-04-09T07:07:38.900Z level=INFO source=main.go:1083 msg="Scrape manager stopped"
time=2025-04-09T07:07:38.900Z level=INFO source=notifier.go:716 msg="Stopping notification manager..." component=notifier
time=2025-04-09T07:07:38.900Z level=INFO source=notifier.go:408 msg="Draining any remaining notifications..." component=notifier
time=2025-04-09T07:07:38.900Z level=INFO source=notifier.go:414 msg="Remaining notifications drained" component=notifier time=2025-04-09T07:11:46.241Z
source=notifier.go:344 msg="Notification manager stopped" component=notifier
time=2025-04-09T07:07:38.900Z level=INFO source=main.go:1361 msg="Notifier manager stopped"
time=2025-04-09T07:07:38.900Z level=INFO source=main.go:1375 msg="See you next time!"
```

3.2 Installation de Windows Exporter

1. Téléchargement depuis GitHub :

https://github.com/prometheus-community/windows_exporter/releases

The screenshot shows a web browser window with the URL https://github.com/prometheus-community/windows_exporter/releases. The page content includes:

- A note about a first contribution by [@yarix](#).
- A link to the [Full Changelog](#) (v0.30.4...v0.31.0-beta.0).
- A "Contributors" section showing icons for jkroepke, renovate, and 2 other contributors.
- An "Assets" section listing the following files:

File	Size	Last Updated
sha256sums.txt	428 Bytes	3 days ago
windows_exporter-0.31.0-beta.0-amd64.exe	23.9 MB	3 days ago
windows_exporter-0.31.0-beta.0-amd64.msi	11.8 MB	3 days ago
windows_exporter-0.31.0-beta.0-arm64.exe	22.4 MB	3 days ago
windows_exporter-0.31.0-beta.0-arm64.msi	11.1 MB	3 days ago
Source code (zip)		4 days ago
Source code (tar.gz)		4 days ago

2. Lancement direct de windows_exporter.exe

```
C:\Users\Etudiant\Downloads\windows_exporter-0.31.0-beta.0-amd64.exe
time=2025-04-09T07:36:10.933Z level=WARN source=os.go:111 msg="The os collector holds a number of deprecated metrics and will be removed mid 2025. See https://github.com/prometheus-community/windows_exporter/pull/1596 for more information." collector=os
time=2025-04-09T07:36:10.934Z level=WARN source=cs.go:77 msg="The cs collector is deprecated and will be removed in a future release. Logical processors has been moved to cpu_info collector. Physical memory has been moved to memory collector. Hostname has been moved to os collector."
time=2025-04-09T07:36:12.252Z level=INFO source=net.go:288 msg="nic/addresses collector is in an experimental state! The configuration and metrics may change in future. Please report any issues." collector=net
time=2025-04-09T07:36:12.260Z level=INFO source=main.go:269 msg="Running as OR-SC-ETU\Etudiant"
time=2025-04-09T07:36:12.260Z level=INFO source=main.go:182 msg="Enabled collectors: cpu, cs, memory, logical_disk, physical_disk, net, os, service, system"
time=2025-04-09T07:36:12.261Z level=INFO source=main.go:200 msg="Starting windows_exporter in 1.338351s" version=0.31.0-beta.0 branch=HEAD revision=ba605cffcc3503645bb57542b46662d3244dd goversion=g01.24.2 builddate=20250406-11:45:01 maxprocs=8
time=2025-04-09T07:36:12.262Z level=INFO source=tls_config.go:347 msg="Listening on" address=[::]:9182
time=2025-04-09T07:36:12.262Z level=INFO source=tls_config.go:350 msg="TLS is disabled." http2=false address=[::]:9182
time=2025-04-09T09:48:30.935Z level=WARN source=service.go:359 msg="failed to get process start time" collector=service service=sppsvc err="failed to open process Param ètre incorrect."
```

3. Vérification de l'accès à l'URL :

```

# HELP go_build_info Build information about the main Go module.
# TYPE go_build_info gauge
go_build_info{checksum="",path="github.com/prometheus-community/windows_exporter",version="v0.31.0-beta.0+dirty"} 1
# HELP go_gc_duration_seconds A summary of the wall-time pause (stop-the-world) duration in garbage collection cycles.
# TYPE go_gc_duration_seconds summary
go_gc_duration_seconds{quantile="0"} 0
go_gc_duration_seconds{quantile="0.25"} 0
go_gc_duration_seconds{quantile="0.5"} 0.0005193
go_gc_duration_seconds{quantile="1"} 0.0222098
go_gc_duration_seconds{sum=7.0517393}
go_gc_duration_seconds{count=4143}
# HELP go_gc_gogo_percent Heap size target percentage configured by the user, otherwise 100. This value is set by the GOGC environment variable, and the runtime/debug.SetGCPercent function. Sourced from /gc/gogo:percent.
# TYPE go_gc_gogo_percent gauge
go_gc_gogo_percent 100
# HELP go_gc_gomemlimit_bytes Go runtime memory limit configured by the user, otherwise math.MaxInt64. This value is set by the GOMEMLIMIT environment variable, and the runtime/debug.SetMemoryLimit function. Sourced from /gc/gomemlimit:bytes.
# TYPE go_gc_gomemlimit_bytes gauge
go_gc_gomemlimit_bytes 2e+08
# HELP go_goroutines Number of goroutines that currently exist.
# TYPE go_goroutines gauge
go_goroutines 17
# HELP go_info Information about the Go environment.
# TYPE go_info gauge
go_info{version="go1.24.2"} 1
# HELP go_memstats_alloc_bytes Number of bytes allocated in heap and currently in use. Equals to /memory/classes/heap/objects:bytes.
# TYPE go_memstats_alloc_bytes gauge
go_memstats_alloc_bytes 3.639896e+06
# HELP go_memstats_alloc_bytes_total Total number of bytes allocated in heap until now, even if released already. Equals to /gc/heap/allocs:bytes.
# TYPE go_memstats_alloc_bytes_total counter
go_memstats_alloc_bytes_total 7.32425856e+09
# HELP go_memstats_buck_hash_sys_bytes Number of bytes used by the profiling bucket hash table. Equals to /memory/classes/profiling/buckets:bytes.
# TYPE go_memstats_buck_hash_sys_bytes gauge
go_memstats_buck_hash_sys_bytes 1.596812e+06
# HELP go_memstats_frees_total Total number of heap objects frees. Equals to /gc/heap/frees:objects + /gc/heap/tiny/allocs:objects.
# TYPE go_memstats_frees_total counter
go_memstats_frees_total 1.11384566e+08
# HELP go_memstats_gc_sys_bytes Number of bytes used for garbage collection system metadata. Equals to /memory/classes/metadata/other:bytes.
# TYPE go_memstats_gc_sys_bytes gauge

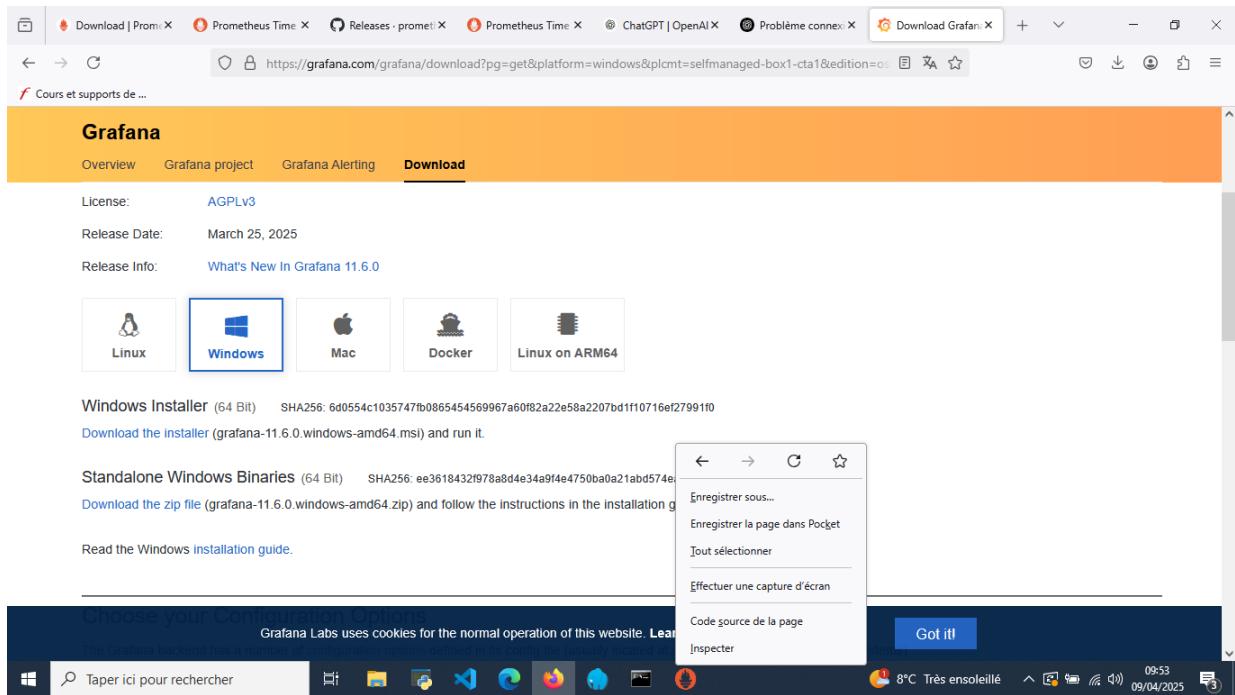
```

prometheus			
Endpoint	Labels	Last scrape	State
http://localhost:9090/metrics	instance="localhost:9090" job="prometheus"	13.674s ago	21ms UP

windows_exporter			
Endpoint	Labels	Last scrape	State
http://localhost:9182/metrics	instance="localhost:9182" job="windows_exporter"	13.058s ago	150ms UP

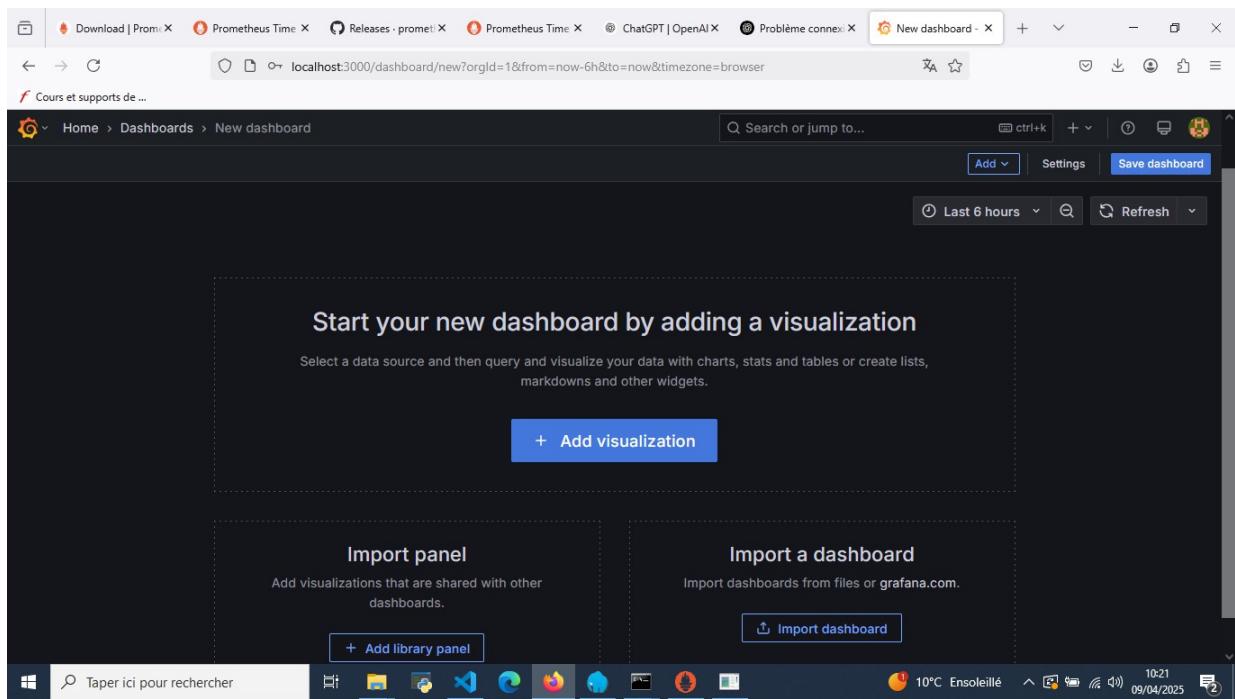
3.3 Installation de Grafana

1. Téléchargement depuis <https://grafana.com>



2. Installation standard sous Windows

3. Accès à Grafana via <http://localhost:3000>



4. Ajout de Prometheus comme Data Source via Settings > Data Sources

The screenshot shows the Grafana interface with the title "Data sources". It displays a single data source entry for "prometheus-local" from Prometheus at http://localhost:9090, marked as "default". There are buttons for "Build a dashboard" and "Explore". A search bar and a sorting dropdown are also present. The browser's address bar shows "localhost:3000/connections/datasources". The system tray at the bottom indicates a temperature of 10:15°C on 09/04/2025.

4. Création du dashboard Grafana

4.1 Panels intégrés

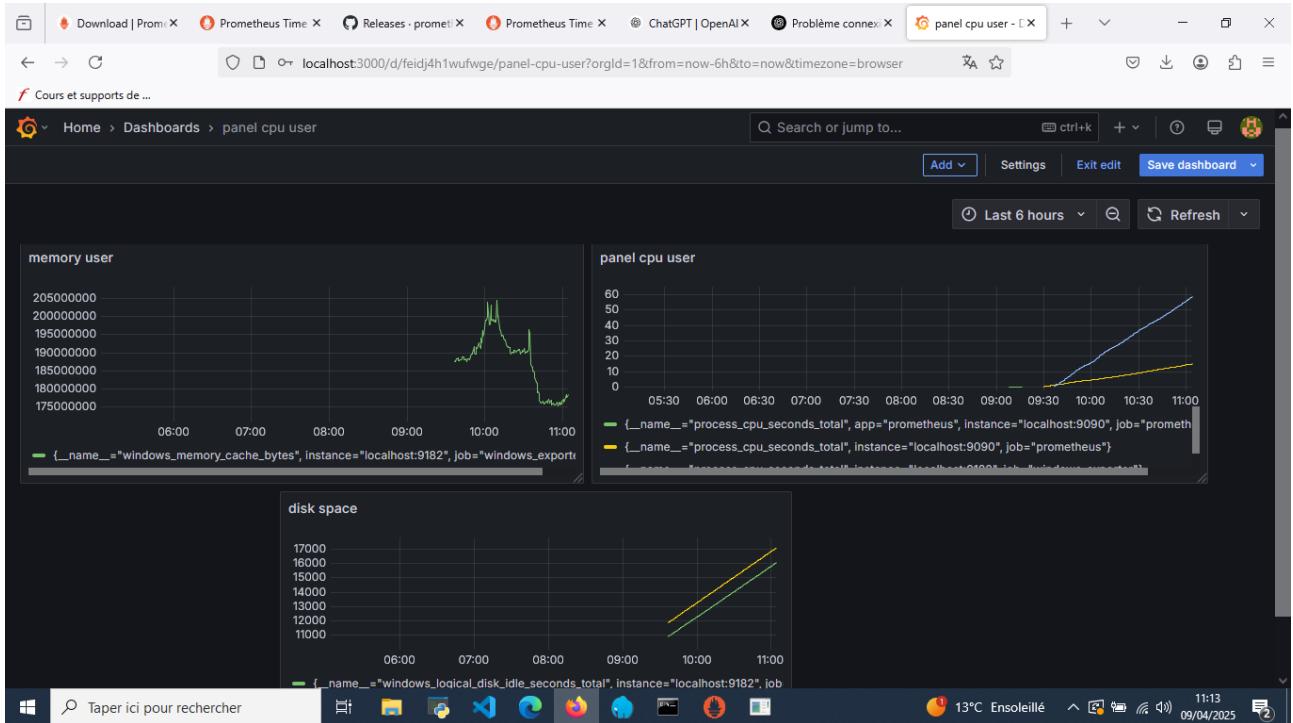
J'ai créé un dashboard personnalisé intitulé "**Monitoring Local PC**" avec les éléments suivants :

- Utilisation CPU (Graphique + Jauge)

The screenshot shows the Grafana panel editor for a panel titled "panel cpu user". It displays a line chart of CPU usage over the last 6 hours. The chart has two series: a solid blue line for "process_cpu_seconds_total" from "prometheus-local" and a dashed red line for the same metric from "localhost:9090". The editor interface includes tabs for "Table view", "Last 6 hours", "Refresh", and "Time series". On the right, there are sections for "Panel options" (Title: "panel cpu user", Description: empty), "Panel links", "Repeat options", and "Tooltip". The browser's address bar shows "localhost:3000/d/feidj4h1wufwge/panel-cpu-user?orgId=1&from=now-6h&to=now&timezone=browser&editPanel=1". The system tray at the bottom indicates a temperature of 10:39°C on 09/04/2025.

- Mémoire RAM utilisée

- Espace disque disponible
- Taux de charge CPU par cœur



4.2 Design et lisibilité

Description du dashboard Grafana

Ce tableau de bord Grafana a été conçu pour visualiser en temps réel l'état des ressources système de mon PC local grâce aux métriques collectées par **Prometheus** via le **Windows Exporter**. Il regroupe trois panels principaux, chacun dédié à une ressource clé :

1. Panel "memory user"

- **Métrique utilisée** : windows_memory_cache_bytes
- **Source** : Windows Exporter via Prometheus (localhost:9182)
- **Affichage** : Courbe montrant l'évolution de la mémoire cache utilisée.
- **Utilité** : Permet de suivre l'utilisation de la mémoire cache et détecter les pics ou fuites potentielles de mémoire.

2. Panel "panel cpu user"

- **Métriques utilisées** : process_cpu_seconds_total (plusieurs instances)
- **Sources** : Prometheus (localhost:9090) et autres process locaux
- **Affichage** : Courbes représentant l'utilisation CPU par différents processus.
- **Utilité** : Utile pour surveiller la charge CPU générée par Prometheus ou d'autres services, et identifier ceux qui consomment le plus de ressources.

3. Panel "disk space"

- **Métrique utilisée** : windows_logical_disk_idle_seconds_total
- **Source** : Windows Exporter (localhost:9182)
- **Affichage** : Courbe représentant le temps d'inactivité des disques.
- **Utilité** : Fournit une vue indirecte de l'activité disque — moins il y a d'inactivité, plus le disque est sollicité.

•

5. Alertes et notifications

5.1 Seuils d'alerte définis

Ressource	Condition	Seuil	Justification
CPU	avg(rate(process_cpu_seconds_total[1m])) > 0.8	> 80%	Charge élevée à surveiller
RAM	windows_os_physical_memory_free_bytes < 1Go	< 1 Go	Risque de saturation mémoire
Disque	windows_logical_disk_free_bytes < 5Go	< 5 Go	Manque d'espace sur le disque

5.2 Configuration des alertes

Création dans Prometheus ou Grafana Alerts

The screenshot shows a web browser window with the URL `localhost:3000/alerting/grafana/deidsse6lc1kwe/view`. The page displays the configuration for a Prometheus alert rule named "warning".

Query and conditions tab is selected. The query is:

```
100 - (avg(rate(windows_cpu_time_total{mode="idle"}[5m])) * 100)
```

The threshold is set to "Is above 80".

Table section shows the result of the query:

100 - (avg(rate(windows_cpu_time_total{mode="idle"}[5m])) * 100)	72.11691

Threshold section shows the alert condition:

Input	A Is above 80
Series 1	0 Normal

The alert has a status of "Normal".

The screenshot shows the Prometheus Alerting interface with the URL `localhost:3000/alerting/beihgx0l4sdmoa/edit`. The main title is "Edit rule - Alert rule". The top navigation bar includes tabs for Home, Alerting, Alert rules, and Edit rule. Below the navigation is a search bar and a toolbar with buttons for Save rule, Save rule and exit, Cancel, and Delete.

The main content area is titled "2. Define query and alert condition". It contains two sections:

- Metrics browser:** Shows a query editor with the following code:

```
100 * (1 - (windows_memory_available_bytes < 1073741824))
```

This query fetches all series matching metric name and label filters.
- Alert condition:** Set to "IS BELOW" with a threshold value of "1".

At the bottom, there is a "Preview alert rule condition" button and a search bar labeled "Taper ici pour rechercher". The taskbar at the bottom shows various application icons.

The screenshot shows the Grafana Monitoring Local interface with the URL `localhost:3000/alerting/grafana/ceihiq383hzb4f/view`. The main title is "DISQUE - new - M". The top navigation bar includes tabs for Home, Alerting, Monitoring Local, and new. Below the navigation is a search bar and a toolbar with buttons for Edit and More.

The main content area is titled "DISQUE". It contains three sections:

- Query and conditions:** Shows a query editor with the following code:

```
100 * (1 - (windows_logical_disk_free_bytes < 5368709120))
```

This query fetches data from the "windows_exporter" job for the "HarddiskVolume4" volume.
- Table:** Displays the result of the query:

```
{instance="localhost:9182", job="windows_exporter", volume="HarddiskVolume4"} -202165452700
```
- Threshold:** Set to "Is above 80".

At the bottom, there is a search bar labeled "Taper ici pour rechercher" and a taskbar at the bottom.

The screenshot shows the Grafana Alerting interface at the URL localhost:3000/alerting/list. The interface displays three alert rules under the 'Monitoring Local' monitoring source:

State	Name	Health	Summary	Next evaluation	Actions
Normal	CPU	ok		in a few seconds	View Edit More
Normal	RAM	nodata		in a few seconds	View Edit More
Normal	DISQUE	ok		in a few seconds	View Edit More

Below the alert list, there is a 'Data source-managed' section with a '+ New recording rule' button.

Notre travail sera accompagné d'un fichier yaml ou se trouve les configuration des alerte

5.3 Notification par email (ou Slack)

- Configuration d'un canal de notification email (SMTP)

```
# grafana.exe - Bloc-notes
Fichier Edition Format Affichage Aide

# Validate permissions' action and scope on role creation and update
permission_validation_enabled = true

#####
[smtp]
enabled = true
host = smtp.gmail.com:587
user = tchoupeherv94@gmail.com
# If the password contains # or ; you have to wrap it with triple quotes. Ex """#password;"""
password =
cert_file =
key_file =
skip_verify = true
from_address = tchoupeherv94@gmail.com
from_name = Grafana
ehlo_identity =
startTLS_policy =
enable_tracing = false
skip_verify = true
[smtp.static_headers]
# Include custom static headers in all outgoing emails

[emails]
welcome_email_on_sign_up = false
templates_pattern = emails/*.html, emails/*.txt
content_types = text/html

#####
[log]
# Either "console", "file", "syslog". Default is console and file
# Use space to separate multiple modes, e.g. "console file"
mode = console file

# Either "debug", "info", "warn", "error", "critical", default is "info"
level = info
<
```

Name *
grafana-default-email

Integration
Email

Addresses
tchoupeherv94@gmail.com

Optional Email settings
Single email

Message

Subject

- Test de déclenchement d'alerte (en simulant une charge CPU élevée)

Contact points

Choose how to notify your contact point

Update contact point

Name *
grafana-default-email

Integration
Email

Addresses
tchoupeherv94@gmail.com

Test contact point

Notification message
Predefined Custom

Failed to send test alert: SMTP not configured, check your grafana.ini config file's [smtp] section

Send test notification

voilà la difficulté que je rencontre ce qui m'en peche de conclure et menée a bien mon projet

6. Conclusion

Grâce à ce projet, j'ai mis en place une **solution complète de monitoring local**. Cette infrastructure me permet de surveiller l'état de santé de mon PC en temps réel, d'anticiper les problèmes de ressources, et d'améliorer la visibilité sur l'utilisation du système