

Escuela Politécnica Nacional

[Actividad extracurricular 2b] Módulo logging

Asignatura: Métodos Numéricos

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Fecha: 15/07/2025

Objetivo

Conocer y utilizar el módulo de logging en Python.

Indicaciones

- Investigue sobre el módulo de logging.
- Cree un ejemplo que: realice logging en consola, en un archivo, en un mensaje de Telegram.
- Modifique el logging para mostrar el nombre del archivo, incluir la fecha y la hora, cambiar de color, etc.

1. ¿Qué es el módulo `logging`?

El módulo `logging` permite implementar un sistema robusto y flexible para registrar eventos que ocurren durante la ejecución de programas. Este sistema puede ser configurado para enviar mensajes de log a distintos destinos (consola, archivos, servicios web, etc.) con diferentes niveles de severidad.

Usos fundamentales del módulo `logging`

1. Logging en consola

Permite mostrar los mensajes directamente en la terminal, ideal para monitoreo en tiempo real durante el desarrollo o ejecución de scripts.

- Se usa `StreamHandler` o la configuración por defecto de `basicConfig`.
 - Comúnmente combinado con los niveles: `DEBUG`, `INFO`, `WARNING`, `ERROR`, `CRITICAL`.
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2. Logging en archivos

Se usa para registrar logs históricos o de auditoría que pueden ser revisados después de la ejecución.

- Se utiliza `FileHandler` para guardar mensajes en un archivo plano (`.log`, `.txt`, etc.).

- Puede complementarse con `RotatingFileHandler` para manejar tamaños máximos o backups automáticos.
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3. Logging en Telegram

Se puede integrar `logging` con bots de Telegram usando un `Handler` personalizado que envíe mensajes a través de la API de Telegram.

- Se necesita un **Token de bot** y un **chat_id** de destino.
 - Se puede usar `requests.post()` para enviar los mensajes.
 - Muy útil para recibir **alertas críticas** o fallos graves desde sistemas en producción.
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Personalización del logging

El sistema de logging permite modificar el **formato de salida** de los mensajes. Esto se logra usando un objeto `Formatter`, que define cómo se verá cada mensaje de log.

Los componentes más comunes del formato son:

- `%(asctime)s`: Fecha y hora
- `%(levelname)s`: Nivel de severidad
- `%(filename)s`: Nombre del archivo fuente
- `%(funcName)s`: Nombre de la función
- `%(message)s`: El mensaje propiamente dicho
- `%(name)s`: Nombre del logger o módulo

También es posible añadir colores a los mensajes en consola utilizando:

- **ANSI escape codes** (manual)
 - **Librerías externas** como `colorlog`
-

Niveles de severidad

Los niveles de severidad determinan la importancia del mensaje que se registra. El módulo `logging` define los siguientes niveles estándar:

Nivel	Valor Numérico	Método en código	Uso típico
DEBUG	10	<code>logger.debug()</code>	Información detallada útil para depuración
INFO	20	<code>logger.info()</code>	Confirmación de que todo funciona correctamente
WARNING	30	<code>logger.warning()</code>	Indicaciones de posibles problemas

Nivel	Valor Numérico	Método en código	Uso típico
ERROR	40	<code>logger.error()</code>	Errores que impiden una parte del programa
CRITICAL	50	<code>logger.critical()</code>	Fallos graves que pueden detener el programa

Nota: Puedes establecer el nivel de logging mínimo con `logger.setLevel(logging.WARNING)`, por ejemplo, para ignorar los mensajes con niveles más bajos.

2. Ejemplo práctico

1. Logging en consola con formato personalizado

```
import logging

# Configuración del logging en consola
logging.basicConfig(
    level=logging.DEBUG,
    format='%(asctime)s - %(filename)s - %(levelname)s - %(message)s',
    datefmt='%Y-%m-%d %H:%M:%S'
)

logger = logging.getLogger(__name__)

# Prueba de mensajes
logger.debug("Este es un mensaje DEBUG")
logger.info("Este es un mensaje INFO")
logger.warning("Este es un mensaje WARNING")
logger.error("Este es un mensaje ERROR")
logger.critical("Este es un mensaje CRITICAL")
```

```
2025-07-10 21:30:15 - 4246321753.py - DEBUG - Este es un mensaje DEBUG
2025-07-10 21:30:15 - 4246321753.py - INFO - Este es un mensaje INFO
2025-07-10 21:30:15 - 4246321753.py - WARNING - Este es un mensaje
WARNING
2025-07-10 21:30:15 - 4246321753.py - ERROR - Este es un mensaje ERROR
2025-07-10 21:30:15 - 4246321753.py - CRITICAL - Este es un mensaje
CRITICAL
```

2. Logging en archivo con rotación y formato extendido

```
import logging
from logging.handlers import RotatingFileHandler

# Handler para archivo con rotación de tamaño
file_handler = RotatingFileHandler(
```

```

    "registro1.log", maxBytes=1024, backupCount=3, encoding='utf-8'
)

# Formateador
formatter = logging.Formatter(
    fmt='%(asctime)s - %(name)s - %(filename)s:%(lineno)d - %
(levelname)s - %(message)s',
    datefmt='%Y-%m-%d %H:%M:%S'
)

file_handler.setFormatter(formatter)

# Logger principal
logger = logging.getLogger("archivo_logger")
logger.setLevel(logging.INFO)
logger.addHandler(file_handler)

# Mensajes de prueba
logger.info("Inicio del programa")
logger.warning("Advertencia registrada en archivo")
logger.error("Se produjo un error en el sistema")

--- Logging error ---
Traceback (most recent call last):
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 74, in emit
    self.doRollover()
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 179, in doRollover
    self.rotate(self.baseFilename, dfn)
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 115, in rotate
    os.rename(source, dest)
PermissionError: [WinError 32] El proceso no tiene acceso al archivo
porque está siendo utilizado por otro proceso: 'c:\\Users\\PC\\
Desktop\\Atividades extracurriculares\\registro.log' -> 'c:\\Users\\
PC\\Desktop\\Atividades extracurriculares\\registro.log.1'
Call stack:
  File "<frozen runpy>", line 198, in _run_module_as_main
  File "<frozen runpy>", line 88, in _run_code
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel_launcher.py", line 18, in
<module>
    app.launch_new_instance()
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-

```

```
packages\Python311\site-packages\traitlets\config\application.py",
line 1075, in launch_instance
    app.start()
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelapp.py", line 739, in
start
    self.io_loop.start()
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\tornado\platform\asyncio.py", line
205, in start
    self.asyncio_loop.run_forever()
    File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\asyncio\base_events.py", line 608, in run_forever
    self._run_once()
    File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\asyncio\base_events.py", line 1936, in _run_once
    handle._run()
    File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\asyncio\events.py", line 84, in _run
    self._context.run(self._callback, *self._args)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 545,
in dispatch_queue
    await self.process_one()
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PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
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PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 437,
in dispatch_shell
    await result
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\ipkernel.py", line 362, in
execute_request
    await super().execute_request(stream, ident, parent)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 778,
in execute_request
```

```

    reply_content = await reply_content
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\ipkernel.py", line 449, in
do_execute
    res = shell.run_cell(
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\zmqshell.py", line 549, in
run_cell
    return super().run_cell(*args, **kwargs)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3098, in run_cell
    result = self._run_cell(
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3153, in _run_cell
    result = runner(coro)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\async_helpers.py", line
128, in _pseudo_sync_runner
    coro.send(None)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3365, in run_cell_async
    has_raised = await self.run_ast_nodes(code_ast.body, cell_name,
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3610, in run_ast_nodes
    if await self.run_code(code, result, async_=asy):
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3670, in run_code
    exec(code_obj, self.user_global_ns, self.user_ns)
    File "C:\Users\PC\AppData\Local\Temp\ipykernel_29244\975961828.py",
line 23, in <module>
    logger.info("Inicio del programa")
Message: 'Inicio del programa'
Arguments: ()
--- Logging error ---
Traceback (most recent call last):
  File "C:\Program Files\WindowsApps\

```

```

PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 74, in emit
    self.doRollover()
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 179, in doRollover
    self.rotate(self.baseFilename, dfn)
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
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    os.rename(source, dest)
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packages\\Python311\\site-packages\\traitlets\\config\\application.py",
line 1075, in launch_instance
    app.start()
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PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\\LocalCache\\local-
packages\\Python311\\site-packages\\ipykernel\\kernelapp.py", line 739, in
start
    self.io_loop.start()
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PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\\LocalCache\\local-
packages\\Python311\\site-packages\\tornado\\platform\\asyncio.py", line
205, in start
    self.asyncio_loop.run_forever()
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PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\\asyncio\\base_events.py", line 608, in run_forever
    self._run_once()
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PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\\asyncio\\base_events.py", line 1936, in _run_once
    handle._run()
  File "C:\\Program Files\\WindowsApps\\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\\asyncio\\events.py", line 84, in _run

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        self._context.run(self._callback, *self._args)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 545,
in dispatch_queue
        await self.process_one()
    File "C:\Users\PC\AppData\Local\Packages\
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PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
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in dispatch_shell
        await result
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PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
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        reply_content = await reply_content
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        return super().run_cell(*args, **kwargs)
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packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3098, in run_cell
        result = self._run_cell(
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PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3153, in _run_cell
        result = runner(coro)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\async_helpers.py", line

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```

128, in _pseudo_sync_runner
    coro.send(None)
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PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
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PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
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PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
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<module>
    app.launch_new_instance()
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PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\traitlets\config\application.py",
line 1075, in launch_instance
    app.start()
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PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
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PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\asyncio\events.py", line 84, in _run
    self._context.run(self._callback, *self._args)
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PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 545,
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PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 534,
in process_one
    await dispatch(*args)
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in dispatch_shell
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execute_request
    await super().execute_request(stream, ident, parent)
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PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 778,
```

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in execute_request
    reply_content = await reply_content
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PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
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packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3098, in run_cell
    result = self._run_cell(
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
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    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\async_helpers.py", line
128, in _pseudo_sync_runner
    coro.send(None)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3365, in run_cell_async
    has_raised = await self.run_ast_nodes(code_ast.body, cell_name,
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3610, in run_ast_nodes
    if await self.run_code(code, result, async_=asy):
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3670, in run_code
    exec(code_obj, self.user_global_ns, self.user_ns)
    File "C:\Users\PC\AppData\Local\Temp\ipykernel_29244\975961828.py",
line 23, in <module>
    logger.info("Inicio del programa")
Message: 'Inicio del programa'
Arguments: ()
--- Logging error ---
Traceback (most recent call last):

```

```
File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 74, in emit
    self.doRollover()
File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 179, in doRollover
    self.rotate(self.baseFilename, dfn)
File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 115, in rotate
    os.rename(source, dest)
PermissionError: [WinError 32] El proceso no tiene acceso al archivo
porque está siendo utilizado por otro proceso: 'c:\\Users\\PC\\
Desktop\\Atividades extracurriculares\\registro.log' -> 'c:\\Users\\
PC\\Desktop\\Atividades extracurriculares\\registro.log.1'
Call stack:
  File "<frozen runpy>", line 198, in _run_module_as_main
  File "<frozen runpy>", line 88, in _run_code
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel_launcher.py", line 18, in
<module>
    app.launch_new_instance()
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\traitlets\config\application.py",
line 1075, in launch_instance
    app.start()
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelapp.py", line 739, in
start
    self.io_loop.start()
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\tornado\platform\asyncio.py", line
205, in start
    self.asyncio_loop.run_forever()
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\asyncio\base_events.py", line 608, in run_forever
    self._run_once()
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\asyncio\base_events.py", line 1936, in _run_once
    handle._run()
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
```

```
Lib\asyncio\events.py", line 84, in _run
    self._context.run(self._callback, *self._args)
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 545,
in dispatch_queue
    await self.process_one()
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 534,
in process_one
    await dispatch(*args)
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 437,
in dispatch_shell
    await result
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\ipkernel.py", line 362, in
execute_request
    await super().execute_request(stream, ident, parent)
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 778,
in execute_request
    reply_content = await reply_content
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\ipkernel.py", line 449, in
do_execute
    res = shell.run_cell(
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\zmqshell.py", line 549, in
run_cell
    return super().run_cell(*args, **kwargs)
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3098, in run_cell
    result = self._run_cell(
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3153, in _run_cell
    result = runner(coro)
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
```

```

packages\Python311\site-packages\IPython\core\async_helpers.py", line
128, in _pseudo_sync_runner
    coro.send(None)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3365, in run_cell_async
    has_raised = await self.run_ast_nodes(code_ast.body, cell_name,
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3610, in run_ast_nodes
    if await self.run_code(code, result, async_=asy):
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3670, in run_code
    exec(code_obj, self.user_global_ns, self.user_ns)
    File "C:\Users\PC\AppData\Local\Temp\ipykernel_29244\975961828.py",
line 23, in <module>
    logger.info("Inicio del programa")
Message: 'Inicio del programa'
Arguments: ()
--- Logging error ---
Traceback (most recent call last):
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 74, in emit
    self.doRollover()
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 179, in doRollover
    self.rotate(self.baseFilename, dfn)
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 115, in rotate
    os.rename(source, dest)
PermissionError: [WinError 32] El proceso no tiene acceso al archivo
porque está siendo utilizado por otro proceso: 'c:\\Users\\PC\\
Desktop\\Atividades extracurriculares\\registro1.log' -> 'c:\\Users\\
PC\\Desktop\\Atividades extracurriculares\\registro1.log.1'
Call stack:
  File "<frozen runpy>", line 198, in _run_module_as_main
  File "<frozen runpy>", line 88, in _run_code
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel_launcher.py", line 18, in
<module>
    app.launch_new_instance()
    File "C:\Users\PC\AppData\Local\Packages\

```

```
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\traitlets\config\application.py",
line 1075, in launch_instance
    app.start()
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelapp.py", line 739, in
start
    self.io_loop.start()
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\tornado\platform\asyncio.py", line
205, in start
    self.asyncio_loop.run_forever()
    File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\asyncio\base_events.py", line 608, in run_forever
    self._run_once()
    File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\asyncio\base_events.py", line 1936, in _run_once
    handle._run()
    File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\asyncio\events.py", line 84, in _run
    self._context.run(self._callback, *self._args)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 545,
in dispatch_queue
    await self.process_one()
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 534,
in process_one
    await dispatch(*args)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 437,
in dispatch_shell
    await result
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\ipkernel.py", line 362, in
execute_request
    await super().execute_request(stream, ident, parent)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 778,
```

```

in execute_request
    reply_content = await reply_content
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\ipkernel.py", line 449, in
do_execute
    res = shell.run_cell(
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\zmqshell.py", line 549, in
run_cell
    return super().run_cell(*args, **kwargs)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3098, in run_cell
    result = self._run_cell(
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3153, in _run_cell
    result = runner(coro)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\async_helpers.py", line
128, in _pseudo_sync_runner
    coro.send(None)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3365, in run_cell_async
    has_raised = await self.run_ast_nodes(code_ast.body, cell_name,
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3610, in run_ast_nodes
    if await self.run_code(code, result, async_=asy):
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3670, in run_code
    exec(code_obj, self.user_global_ns, self.user_ns)
    File "C:\Users\PC\AppData\Local\Temp\ipykernel_29244\975961828.py",
line 23, in <module>
    logger.info("Inicio del programa")
Message: 'Inicio del programa'
Arguments: ()
--- Logging error ---
Traceback (most recent call last):

```



```
File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 74, in emit
    self.doRollover()
File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 179, in doRollover
    self.rotate(self.baseFilename, dfn)
File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 115, in rotate
    os.rename(source, dest)
PermissionError: [WinError 32] El proceso no tiene acceso al archivo
porque está siendo utilizado por otro proceso: 'c:\\Users\\PC\\
Desktop\\Atividades extracurriculares\\registro1.log' -> 'c:\\Users\\
PC\\Desktop\\Atividades extracurriculares\\registro1.log.1'
Call stack:
  File "<frozen runpy>", line 198, in _run_module_as_main
  File "<frozen runpy>", line 88, in _run_code
  File "C:\\Users\\PC\\AppData\\Local\\Packages\\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\\LocalCache\\local-
packages\\Python311\\site-packages\\ipykernel_launcher.py", line 18, in
<module>
    app.launch_new_instance()
  File "C:\\Users\\PC\\AppData\\Local\\Packages\\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\\LocalCache\\local-
packages\\Python311\\site-packages\\traitlets\\config\\application.py",
line 1075, in launch_instance
    app.start()
  File "C:\\Users\\PC\\AppData\\Local\\Packages\\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\\LocalCache\\local-
packages\\Python311\\site-packages\\ipykernel\\kernelapp.py", line 739, in
start
    self.io_loop.start()
  File "C:\\Users\\PC\\AppData\\Local\\Packages\\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\\LocalCache\\local-
packages\\Python311\\site-packages\\tornado\\platform\\asyncio.py", line
205, in start
    self.asyncio_loop.run_forever()
  File "C:\\Program Files\\WindowsApps\\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\\
Lib\\asyncio\\base_events.py", line 608, in run_forever
    self._run_once()
  File "C:\\Program Files\\WindowsApps\\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\\
Lib\\asyncio\\base_events.py", line 1936, in _run_once
    handle._run()
  File "C:\\Program Files\\WindowsApps\\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\\
```

```
Lib\asyncio\events.py", line 84, in _run
    self._context.run(self._callback, *self._args)
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PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 545,
in dispatch_queue
    await self.process_one()
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 534,
in process_one
    await dispatch(*args)
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PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 437,
in dispatch_shell
    await result
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\ipkernel.py", line 362, in
execute_request
    await super().execute_request(stream, ident, parent)
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PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 778,
in execute_request
    reply_content = await reply_content
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\ipkernel.py", line 449, in
do_execute
    res = shell.run_cell(
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\zmqshell.py", line 549, in
run_cell
    return super().run_cell(*args, **kwargs)
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3098, in run_cell
    result = self._run_cell(
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3153, in _run_cell
    result = runner(coro)
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PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
```

```
packages\Python311\site-packages\IPython\core\async_helpers.py", line
128, in _pseudo_sync_runner
    coro.send(None)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3365, in run_cell_async
    has_raised = await self.run_ast_nodes(code_ast.body, cell_name,
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3610, in run_ast_nodes
    if await self.run_code(code, result, async_=asy):
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3670, in run_code
    exec(code_obj, self.user_global_ns, self.user_ns)
    File "C:\Users\PC\AppData\Local\Temp\ipykernel_29244\975961828.py",
line 23, in <module>
    logger.info("Inicio del programa")
Message: 'Inicio del programa'
Arguments: ()
2025-07-10 21:30:29 - 975961828.py - INFO - Inicio del programa
```

```
--- Logging error ---
Traceback (most recent call last):
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 74, in emit
    self.doRollover()
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 179, in doRollover
    self.rotate(self.baseFilename, dfn)
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 115, in rotate
    os.rename(source, dest)
PermissionError: [WinError 32] El proceso no tiene acceso al archivo
porque está siendo utilizado por otro proceso: 'c:\\Users\\PC\\
Desktop\\Atividades extracurriculares\\registro.log' -> 'c:\\Users\\
PC\\Desktop\\Atividades extracurriculares\\registro.log.1'
Call stack:
  File "<frozen runpy>", line 198, in _run_module_as_main
  File "<frozen runpy>", line 88, in _run_code
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel_launcher.py", line 18, in
<module>
```

```

    app.launch_new_instance()
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\traitlets\config\application.py",
line 1075, in launch_instance
    app.start()
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelapp.py", line 739, in
start
    self.io_loop.start()
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\tornado\platform\asyncio.py", line
205, in start
    self.asyncio_loop.run_forever()
    File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\asyncio\base_events.py", line 608, in run_forever
    self._run_once()
    File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\asyncio\base_events.py", line 1936, in _run_once
    handle._run()
    File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\asyncio\events.py", line 84, in _run
    self._context.run(self._callback, *self._args)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 545,
in dispatch_queue
    await self.process_one()
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 534,
in process_one
    await dispatch(*args)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 437,
in dispatch_shell
    await result
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\ipkernel.py", line 362, in
execute_request
    await super().execute_request(stream, ident, parent)
    File "C:\Users\PC\AppData\Local\Packages\

```

```

PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 778,
in execute_request
    reply_content = await reply_content
File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\ipkernel.py", line 449, in
do_execute
    res = shell.run_cell(
File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\zmqshell.py", line 549, in
run_cell
    return super().run_cell(*args, **kwargs)
File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3098, in run_cell
    result = self._run_cell(
File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3153, in _run_cell
    result = runner(coro)
File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\async_helpers.py", line
128, in _pseudo_sync_runner
    coro.send(None)
File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3365, in run_cell_async
    has_raised = await self.run_ast_nodes(code_ast.body, cell_name,
File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3610, in run_ast_nodes
    if await self.run_code(code, result, async_=asy):
File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3670, in run_code
    exec(code_obj, self.user_global_ns, self.user_ns)
File "C:\Users\PC\AppData\Local\Temp\ipykernel_29244\975961828.py",
line 24, in <module>
    logger.warning("Advertencia registrada en archivo")
Message: 'Advertencia registrada en archivo'
Arguments: ()

```

```

--- Logging error ---
Traceback (most recent call last):
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 74, in emit
    self.doRollover()
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 179, in doRollover
    self.rotate(self.baseFilename, dfn)
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 115, in rotate
    os.rename(source, dest)
PermissionError: [WinError 32] El proceso no tiene acceso al archivo
porque está siendo utilizado por otro proceso: 'c:\\Users\\PC\\
Desktop\\Atividades extracurriculares\\registro.log' -> 'c:\\Users\\
PC\\Desktop\\Atividades extracurriculares\\registro.log.1'
Call stack:
  File "<frozen runpy>", line 198, in _run_module_as_main
  File "<frozen runpy>", line 88, in _run_code
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel_launcher.py", line 18, in
<module>
    app.launch_new_instance()
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\traitlets\config\application.py",
line 1075, in launch_instance
    app.start()
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelapp.py", line 739, in
start
    self.io_loop.start()
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\tornado\platform\asyncio.py", line
205, in start
    self.asyncio_loop.run_forever()
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\asyncio\base_events.py", line 608, in run_forever
    self._run_once()
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\asyncio\base_events.py", line 1936, in _run_once
    handle._run()

```

```

File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\asyncio\events.py", line 84, in _run
    self._context.run(self._callback, *self._args)
File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 545,
in dispatch_queue
    await self.process_one()
File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 534,
in process_one
    await dispatch(*args)
File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 437,
in dispatch_shell
    await result
File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\ipkernel.py", line 362, in
execute_request
    await super().execute_request(stream, ident, parent)
File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 778,
in execute_request
    reply_content = await reply_content
File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\ipkernel.py", line 449, in
do_execute
    res = shell.run_cell(
File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\zmqshell.py", line 549, in
run_cell
    return super().run_cell(*args, **kwargs)
File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3098, in run_cell
    result = self._run_cell(
File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3153, in _run_cell
    result = runner(coro)

```

```

File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\async_helpers.py", line
128, in _pseudo_sync_runner
    coro.send(None)
File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3365, in run_cell_async
    has_raised = await self.run_ast_nodes(code_ast.body, cell_name,
File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3610, in run_ast_nodes
    if await self.run_code(code, result, async_=asy):
File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3670, in run_code
    exec(code_obj, self.user_global_ns, self.user_ns)
File "C:\Users\PC\AppData\Local\Temp\ipykernel_29244\975961828.py",
line 24, in <module>
    logger.warning("Advertencia registrada en archivo")
Message: 'Advertencia registrada en archivo'
Arguments: ()
2025-07-10 21:30:29 - 975961828.py - WARNING - Advertencia registrada
en archivo
--- Logging error ---
Traceback (most recent call last):
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 74, in emit
    self.doRollover()
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 179, in doRollover
    self.rotate(self.baseFilename, dfn)
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 115, in rotate
    os.rename(source, dest)
PermissionError: [WinError 32] El proceso no tiene acceso al archivo
porque está siendo utilizado por otro proceso: 'c:\\Users\\PC\\
Desktop\\Atividades extracurriculares\\registro.log' -> 'c:\\Users\\
PC\\Desktop\\Atividades extracurriculares\\registro.log.1'
Call stack:
  File "<frozen runpy>", line 198, in _run_module_as_main
  File "<frozen runpy>", line 88, in _run_code
  File "C:\Users\PC\AppData\Local\Packages\

```



```
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel_launcher.py", line 18, in
<module>
    app.launch_new_instance()
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\traitlets\config\application.py",
line 1075, in launch_instance
    app.start()
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelapp.py", line 739, in
start
    self.io_loop.start()
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\tornado\platform\asyncio.py", line
205, in start
    self.asyncio_loop.run_forever()
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\asyncio\base_events.py", line 608, in run_forever
    self._run_once()
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\asyncio\base_events.py", line 1936, in _run_once
    handle._run()
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\asyncio\events.py", line 84, in _run
    self._context.run(self._callback, *self._args)
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 545,
in dispatch_queue
    await self.process_one()
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 534,
in process_one
    await dispatch(*args)
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 437,
in dispatch_shell
    await result
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\ipkernel.py", line 362, in
```

```

execute_request
    await super().execute_request(stream, ident, parent)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 778,
in execute_request
    reply_content = await reply_content
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\ipkernel.py", line 449, in
do_execute
    res = shell.run_cell(
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\zmqshell.py", line 549, in
run_cell
    return super().run_cell(*args, **kwargs)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3098, in run_cell
    result = self._run_cell(
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3153, in _run_cell
    result = runner(coro)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\async_helpers.py", line
128, in _pseudo_sync_runner
    coro.send(None)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3365, in run_cell_async
    has_raised = await self.run_ast_nodes(code_ast.body, cell_name,
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3610, in run_ast_nodes
    if await self.run_code(code, result, async_=asy):
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3670, in run_code
    exec(code_obj, self.user_global_ns, self.user_ns)
    File "C:\Users\PC\AppData\Local\Temp\ipykernel_29244\975961828.py",
line 25, in <module>

```

```
logger.error("Se produjo un error en el sistema")
Message: 'Se produjo un error en el sistema'
Arguments: ()
--- Logging error ---
Traceback (most recent call last):
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 74, in emit
    self.doRollover()
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 179, in doRollover
    self.rotate(self.baseFilename, dfn)
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\logging\handlers.py", line 115, in rotate
    os.rename(source, dest)
PermissionError: [WinError 32] El proceso no tiene acceso al archivo
porque está siendo utilizado por otro proceso: 'c:\\Users\\PC\\
Desktop\\Atividades extracurriculares\\registro.log' -> 'c:\\Users\\
PC\\Desktop\\Atividades extracurriculares\\registro.log.1'
Call stack:
  File "<frozen runpy>", line 198, in _run_module_as_main
  File "<frozen runpy>", line 88, in _run_code
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel_launcher.py", line 18, in
<module>
    app.launch_new_instance()
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\traitlets\config\application.py",
line 1075, in launch_instance
    app.start()
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelapp.py", line 739, in
start
    self.io_loop.start()
  File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\tornado\platform\asyncio.py", line
205, in start
    self.asyncio_loop.run_forever()
  File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\asyncio\base_events.py", line 608, in run_forever
    self._run_once()
  File "C:\Program Files\WindowsApps\
```

```

PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\asyncio\base_events.py", line 1936, in _run_once
    handle._run()
    File "C:\Program Files\WindowsApps\
PythonSoftwareFoundation.Python.3.11_3.11.2544.0_x64__qbz5n2kfra8p0\
Lib\asyncio\events.py", line 84, in _run
        self._context.run(self._callback, *self._args)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 545,
in dispatch_queue
    await self.process_one()
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 534,
in process_one
    await dispatch(*args)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 437,
in dispatch_shell
    await result
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\ipkernel.py", line 362, in
execute_request
    await super().execute_request(stream, ident, parent)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\kernelbase.py", line 778,
in execute_request
    reply_content = await reply_content
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\ipkernel.py", line 449, in
do_execute
    res = shell.run_cell(
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\ipykernel\zmqshell.py", line 549, in
run_cell
    return super().run_cell(*args, **kwargs)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3098, in run_cell
    result = self._run_cell(
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-

```

```

packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3153, in _run_cell
    result = runner(coro)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\async_helpers.py", line
128, in _pseudo_sync_runner
    coro.send(None)
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3365, in run_cell_async
    has_raised = await self.run_ast_nodes(code_ast.body, cell_name,
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3610, in run_ast_nodes
    if await self.run_code(code, result, async_=asy):
    File "C:\Users\PC\AppData\Local\Packages\
PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\site-packages\IPython\core\interactiveshell.py",
line 3670, in run_code
    exec(code_obj, self.user_global_ns, self.user_ns)
    File "C:\Users\PC\AppData\Local\Temp\ipykernel_29244\975961828.py",
line 25, in <module>
    logger.error("Se produjo un error en el sistema")
Message: 'Se produjo un error en el sistema'
Arguments: ()
2025-07-10 21:30:29 - 975961828.py - ERROR - Se produjo un error en el
sistema

```

3. Logging a Telegram usando requests

```

import logging
import requests
import sys
from logging.handlers import RotatingFileHandler

# === Configuración del bot de Telegram ===
TELEGRAM_TOKEN = '7757825197:AAFhW-9oU_21SpFL6U8pedjmd_VGA7Re-6k'
CHAT_ID = '7243631356'

# === Handler personalizado para Telegram ===
class TelegramHandler(logging.Handler):
    def emit(self, record):
        log_entry = self.format(record)
        url =
f'https://api.telegram.org/bot{TELEGRAM_TOKEN}/sendMessage'
        data = {'chat_id': CHAT_ID, 'text': log_entry}

```

```

        try:
            requests.post(url, data=data)
        except Exception as e:
            print(f"Error enviando mensaje a Telegram: {e}")

# === Formato general ===
formatter = logging.Formatter(
    fmt='[%(asctime)s] %(levelname)s in %(filename)s -> %(funcName)s(): %(message)s',
    datefmt='%Y-%m-%d %H:%M:%S'
)

# === Logger principal ===
logger = logging.getLogger('AppLogger')
logger.setLevel(logging.DEBUG)

# === Logging en consola con color (si tienes colorlog instalado) ===
try:
    from colorlog import ColoredFormatter
    color_formatter = ColoredFormatter(
        "%(log_color)s[%(asctime)s] %(levelname)s - %(message)s",
        datefmt='%H:%M:%S',
        log_colors={
            'DEBUG': 'cyan',
            'INFO': 'green',
            'WARNING': 'yellow',
            'ERROR': 'red',
            'CRITICAL': 'bold_red',
        }
    )
    console_handler = logging.StreamHandler()
    console_handler.setFormatter(color_formatter)
except ImportError:
    console_handler = logging.StreamHandler(sys.stdout)
    console_handler.setFormatter(formatter)

logger.addHandler(console_handler)

# === Logging en archivo con rotación ===
file_handler = RotatingFileHandler("registro_app.log",
    maxBytes=500000, backupCount=3, encoding='utf-8')
file_handler.setFormatter(formatter)
logger.addHandler(file_handler)

# === Logging en Telegram solo para errores críticos ===
telegram_handler = TelegramHandler()
telegram_handler.setLevel(logging.ERROR)
telegram_handler.setFormatter(formatter)
logger.addHandler(telegram_handler)

```

```
# === Ejemplo de uso ===
```

```
def main():  
    logger.debug("Este es un mensaje DEBUG")  
    logger.info("Este es un mensaje INFO")  
    logger.warning("Este es un mensaje WARNING")  
    logger.error(" Este es un mensaje ERROR - será enviado a  
Telegram")  
    logger.critical(" Este es un mensaje CRITICAL - también será  
enviado a Telegram")
```

```
if __name__ == "__main__":  
    main()
```

```
[2025-07-10 21:11:12] DEBUG in 587725574.py -> main(): Este es un  
mensaje DEBUG
```

```
[21:11:12] DEBUG - Este es un mensaje DEBUG  
2025-07-10 21:11:12 - 587725574.py - DEBUG - Este es un mensaje DEBUG
```

```
[2025-07-10 21:11:12] INFO in 587725574.py -> main(): Este es un  
mensaje INFO
```

```
[21:11:12] INFO - Este es un mensaje INFO  
2025-07-10 21:11:12 - 587725574.py - INFO - Este es un mensaje INFO
```

```
[2025-07-10 21:11:12] WARNING in 587725574.py -> main(): Este es un  
mensaje WARNING
```

```
[21:11:12] WARNING - Este es un mensaje WARNING  
2025-07-10 21:11:12 - 587725574.py - WARNING - Este es un mensaje  
WARNING
```

```
[2025-07-10 21:11:12] ERROR in 587725574.py -> main(): Este es un  
mensaje ERROR - será enviado a Telegram
```

```
2025-07-10 21:11:12 - connectionpool.py - DEBUG - Starting new HTTPS  
connection (1): api.telegram.org:443
```

```
2025-07-10 21:11:13 - connectionpool.py - DEBUG -  
https://api.telegram.org:443 "POST /bot7757825197:AAFhW-  
9oU_2lSpFL6U8pedjmd_VGA7Re-6k/sendMessage HTTP/1.1" 200 409
```

```
[21:11:12] ERROR - Este es un mensaje ERROR - será enviado a Telegram
```

```
2025-07-10 21:11:13 - connectionpool.py - DEBUG - Starting new HTTPS  
connection (1): api.telegram.org:443
```

```
2025-07-10 21:11:14 - connectionpool.py - DEBUG -  
https://api.telegram.org:443 "POST /bot7757825197:AAFhW-  
9oU_2lSpFL6U8pedjmd_VGA7Re-6k/sendMessage HTTP/1.1" 200 409
```

```
2025-07-10 21:11:12 - 587725574.py - ERROR - Este es un mensaje ERROR  
- será enviado a Telegram
```

```
[2025-07-10 21:11:14] CRITICAL in 587725574.py -> main(): Este es un  
mensaje CRITICAL - también será enviado a Telegram
```

```
2025-07-10 21:11:14 - connectionpool.py - DEBUG - Starting new HTTPS
connection (1): api.telegram.org:443
2025-07-10 21:11:14 - connectionpool.py - DEBUG -
https://api.telegram.org:443 "POST /bot7757825197:AAFhW-
9oU_2lSpFL6U8pedjmd_VGA7Re-6k/sendMessage HTTP/1.1" 200 429
[21:11:14] CRITICAL - Este es un mensaje CRITICAL - también será
enviado a Telegram
2025-07-10 21:11:14 - connectionpool.py - DEBUG - Starting new HTTPS
connection (1): api.telegram.org:443
2025-07-10 21:11:15 - connectionpool.py - DEBUG -
https://api.telegram.org:443 "POST /bot7757825197:AAFhW-
9oU_2lSpFL6U8pedjmd_VGA7Re-6k/sendMessage HTTP/1.1" 200 429
2025-07-10 21:11:14 - 587725574.py - CRITICAL - Este es un mensaje
CRITICAL - también será enviado a Telegram
```

Conclusiones

- El módulo `logging` en Python permite implementar un sistema centralizado, flexible y extensible para el manejo de mensajes durante la ejecución de programas.
- Gracias a sus distintos niveles de severidad (`DEBUG`, `INFO`, `WARNING`, `ERROR`, `CRITICAL`), es posible filtrar e identificar con precisión eventos relevantes según su importancia.
- Se puede redirigir la salida de logs hacia múltiples destinos: consola, archivos e incluso servicios externos como Telegram, facilitando así la supervisión y alerta remota.
- La personalización del formato y el uso de herramientas como `RotatingFileHandler` o `colorlog` hacen que el sistema sea adaptable tanto para entornos de desarrollo como de producción.
- Integrar `logging` en proyectos reales mejora la depuración, el mantenimiento y el monitoreo de aplicaciones complejas.

Referencias

- Python Software Foundation. (2024). *logging* — *Logging facility for Python*. Documentación oficial de Python 3. Disponible en: <https://docs.python.org/3/library/logging.html>