Practical Work 3: MPI File Transfer

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MPI Implementation Choice

Explain here *which* MPI implementation you decided to use (e.g. MPICH, Open MPI, MS-MPI) and why. Mention:

- Operating system and environment you are using.
- How you installed MPI and the `mpi4py` (or other language binding) library.
- Advantages or limitations that influenced your choice.

MPI Service Design

Describe the design of your MPI-based file transfer service. For example:

- Which ranks act as **sender** and **receiver**.
- What metadata (filename, size, etc.) is exchanged.
- Whether you send the file as a whole or in chunks.

You can include a simple figure of the data flow (e.g. using a drawing tool and importing as PDF/PNG) showing how the file moves from the sender process to the receiver process.

System Organization

Explain how you organize your code and processes:

- Directory structure (e.g. where `mpi_file_transfer.py` is located).
- How you start the system using `mpiexec` or `mpirun`.
- Any scripts or helper tools you use to test your implementation.

File Transfer Implementation

Briefly explain how the actual file transfer is implemented. For example, for the provided Python/`mpi4py` example:

- Rank 0 reads the file, sends metadata (name, size) with `comm.send`.
- Rank 0 then sends the raw bytes in a second message.
- Rank 1 receives metadata and bytes, then writes them to disk.

Include a short code snippet that represents the core of your MPI transfer logic:

Listing 1: Core MPI file transfer snippet

```
meta = {"name": filename, "size": file_size}
comm.send(meta, dest=1, tag=0)

with open(filepath, "rb") as f:
    file_bytes = f.read()

comm.send(file_bytes, dest=1, tag=1)
```

You can replace this snippet with the exact code you implemented (Python, C, C++, etc.).

Group Work and Responsibilities

Describe briefly who did what in your group:

- Design and choice of MPI implementation.
- Implementation of sender and receiver.
- Testing and debugging.
- Writing and formatting the LaTeX report.