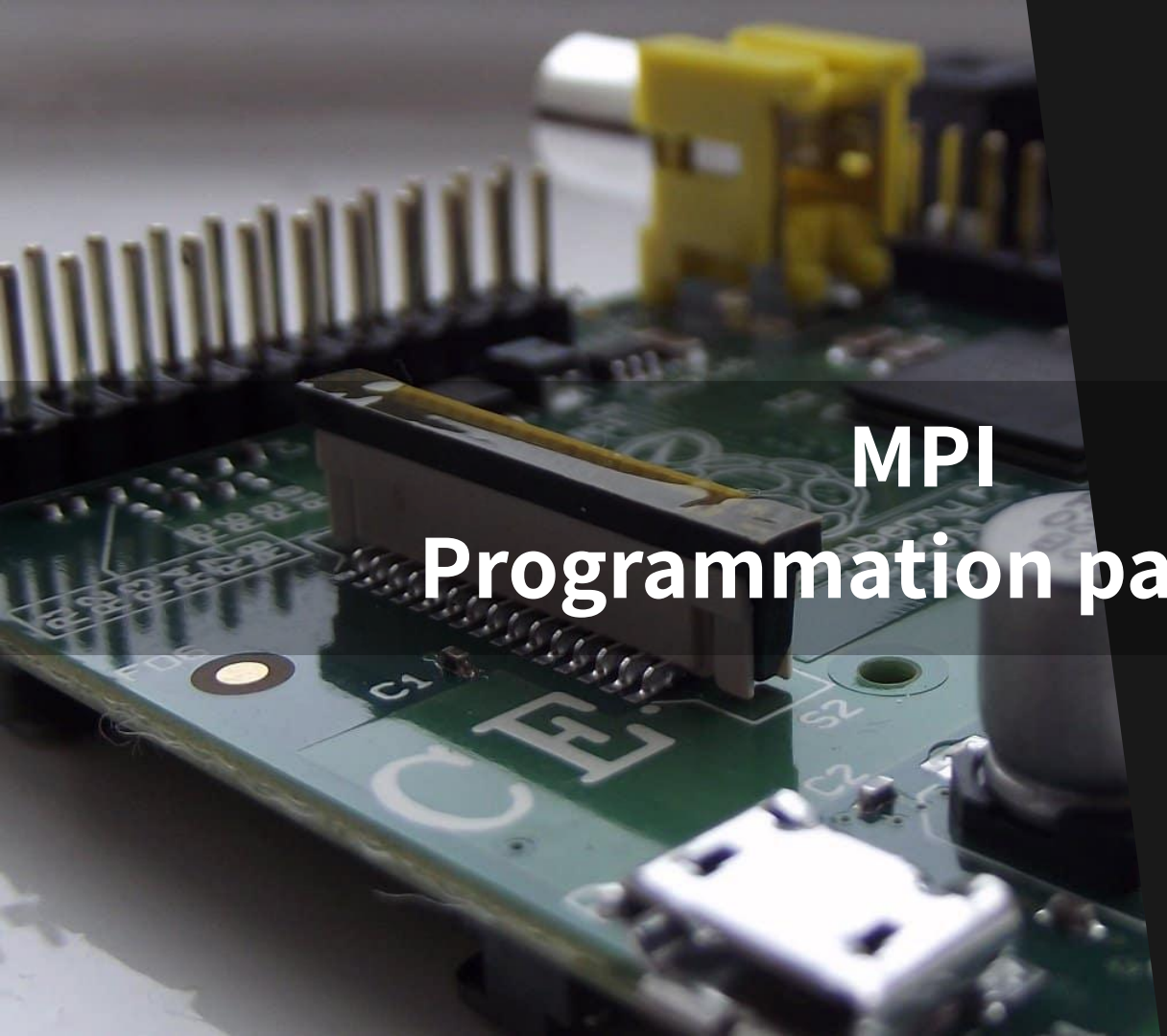
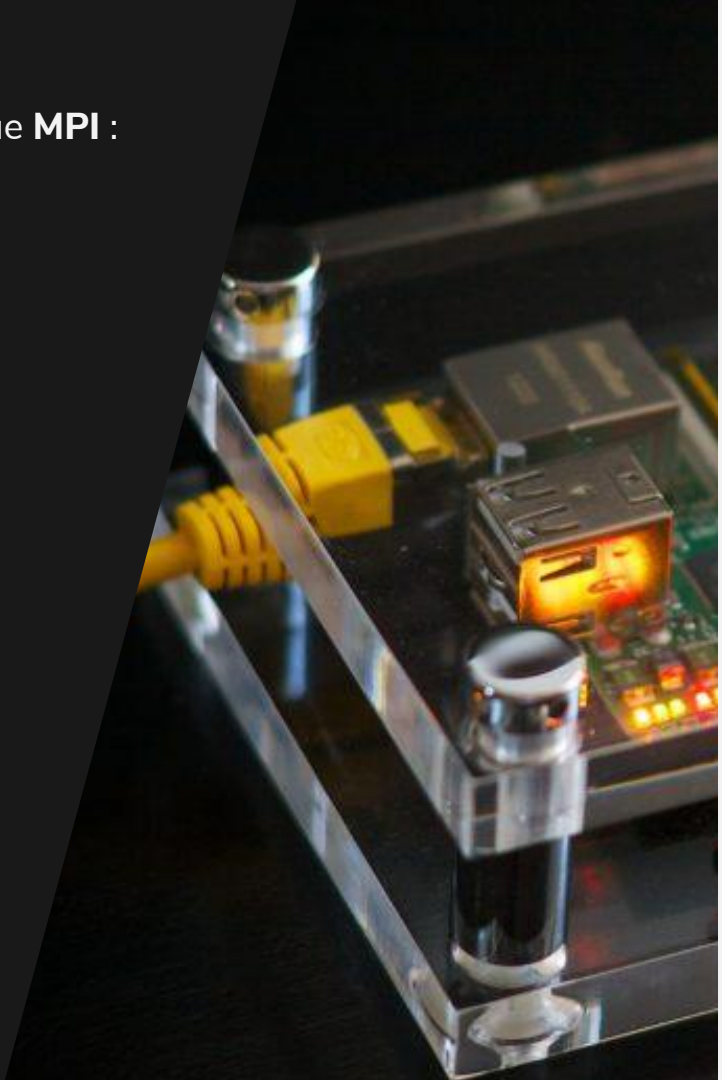


MPI
Programmation parallèle

DENIS Guillaume
DE ARAUJO Bastien
Veille Technologique

Qu’est-ce que **MPI** :



MPI (Message Passing Interface)

- Spécification composée de routines
- Transmissions de messages entre processus
- Processus != Machines

Un peu d’histoire :

MPI (Message Passing Interface)

- Avant les années 90’
  - Aucun standard
  - Domaine Science et Recherche
- la conférence Supercomputing 1992
- En 1994, apparition de MPI-1
- 1997, apparition de MPI-2

Les concepts

Communicateur

- Groupe de processus
- Rang unique
- Communique grâce aux rang

Envoi /Réception

- Envoi avec Rang et étiquette
- MPI_Send/ MPI_Receive
- Communication **point à point**

Collectives

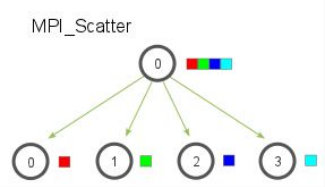
- Envoi à tous les processus ou un groupe.
- MPI_Broadcast/ MPI_Scatter/ MPI_Gather

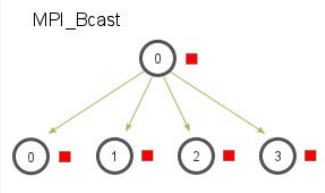
Collectives avancées

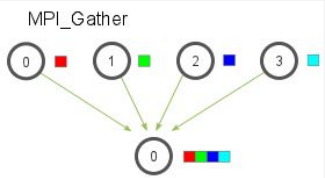
- MPI_Reduce
- MPI_AllReduce

Les routines

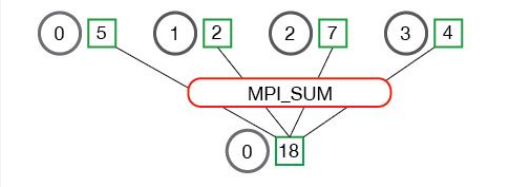
Communications collectives

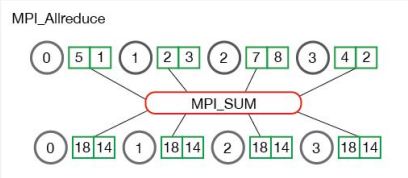






Communications collectives avancées





02

Cas d’utilisations

HelloWorld

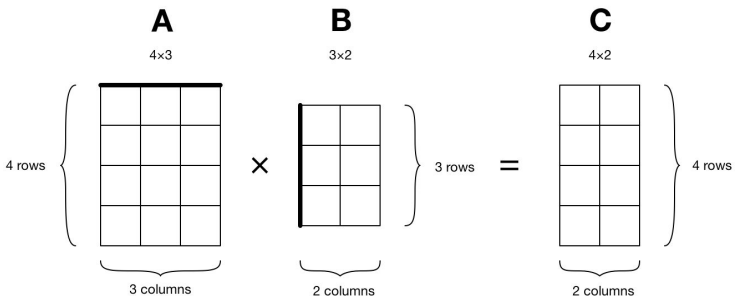
HelloWorld.c

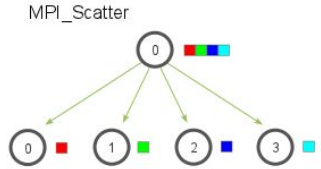
```
mpiuser@node1:~/cloud/helloWolrd $ mpirun -np 8 -hosts node1,node2 ./hello
Hello world from processor node2, rank 1 out of 8 processors
Hello world from processor node2, rank 5 out of 8 processors
Hello world from processor node2, rank 7 out of 8 processors
Hello world from processor node1, rank 4 out of 8 processors
Hello world from processor node2, rank 3 out of 8 processors
Hello world from processor node1, rank 6 out of 8 processors
Hello world from processor node1, rank 0 out of 8 processors
Hello world from processor node1, rank 2 out of 8 processors
```

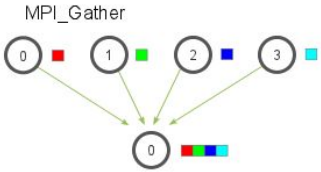
Parallelisation de code

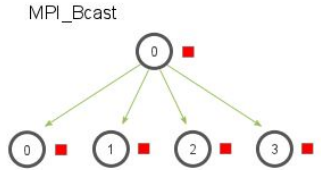
Multiplication de matrices

- Matrice A avec Scatter -
- Matrice B en Broadcast -









Routines MPI

- Init -
- Size -
- Rank -
- Gather -
- Scatter -
- Broadcast -

Deep Neural Network

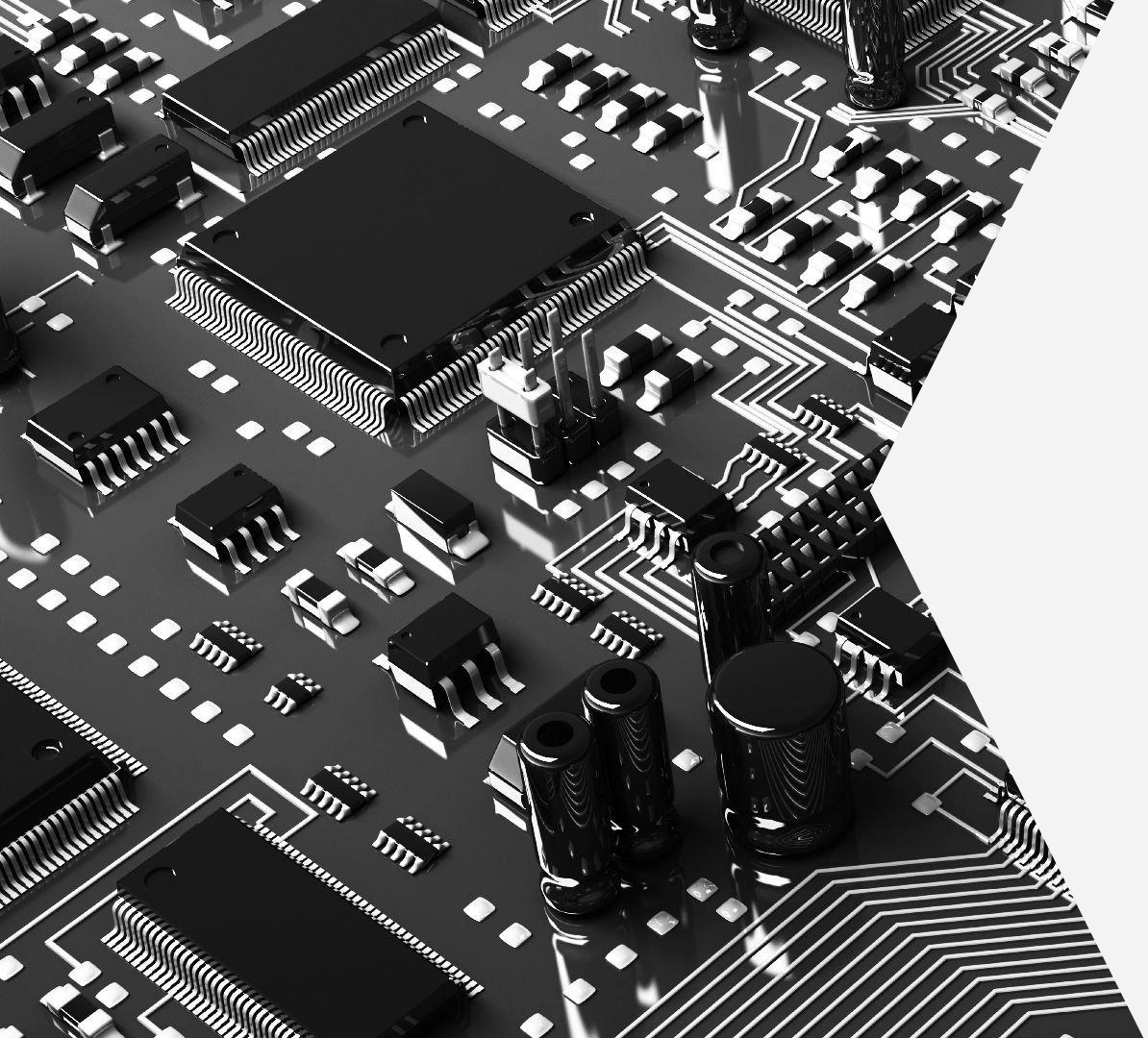
Deep Neural Network

- Gains :
  - Performance
  - Énergie
- Choix du cluster
  - Nombre
  - Matériel

Parallelisation

Résultats

	1 RaspberryPi	8 RaspberryPi	12 RaspberryPi
Temps (secondes) phase d'apprentissage	361.534877	361.534877	361.534877
Temps (secondes) phase d'exploitation	94.644920	28.083728	22.900819
Watt	48	51	54
Wattheure	6.082397293	5.820875968	5.163977312



03

Pour résumer

04

Démonstration

Merci pour votre attention

Vous avez des questions ?