MPI — Examples

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Definite integral — parallel

```
if (my_rank == 0) {
  printf("Enter a, b and n\n"); scanf("%f %f %d",&a,&b,&n);
 }
MPI_Bcast(&a,1,MPI_FLOAT,0,MPI_COMM_WORLD);
MPI_Bcast(&b,1,MPI_FLOAT,0,MPI_COMM_WORLD);
MPI_Bcast(&n,1,MPI_INT,0,MPI_COMM_WORLD);

h = (b-a)/n;
r=n%p;
if (my_rank < r) {
  local_n = n/p +1;
  local_a = a+my_rank*local_n*h;
 } else {
  local_n = n/p+1; local_a = a+r*local_n*h;
  local_n = n/p; local_a = local_a + (my_rank-r)*local_n*h;
 }
local_b = local_a+local_n*h;
```

Definite integral — parallel

```
local_int=Trap(local_a, local_b,
                local_n, h);

MPI_Reduce(&local_int,&integral,1,MPI_FLOAT,
           MPI_SUM,0,MPI_COMM_WORLD);
if (my_rank == 0) {
  printf("With n=%d trapezoids we estimate integral",n);
  printf(" from %f to %f:  %f\n",a,b,integral);
 }
```

Dot product of two vectors

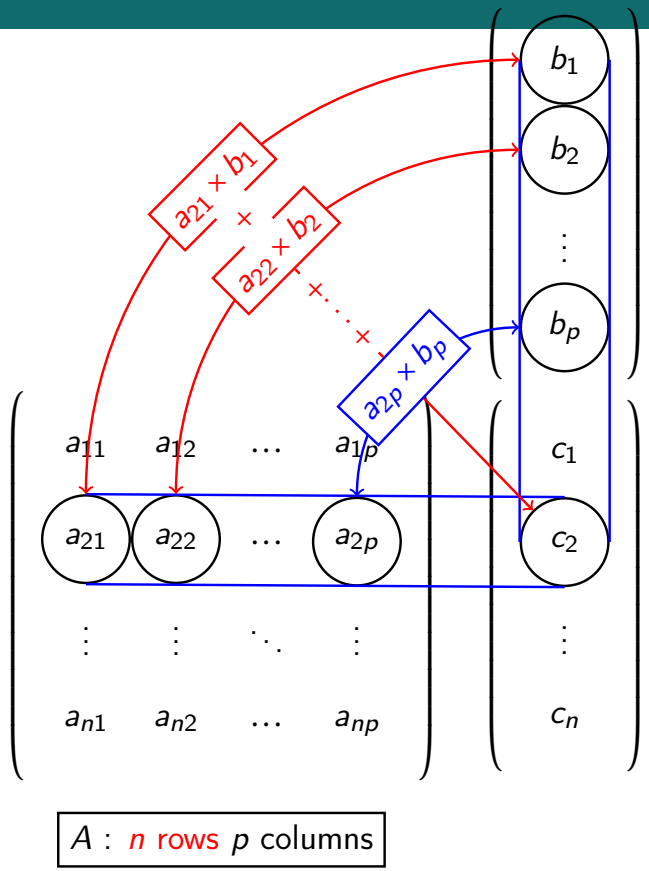
Write a code that computes the dot product of two vectors.

```
float fdot(int n, float *v1, float *v2){
  int i;
  float fd;

  fd = 0.0;
  for (i=0; i<n; i++)  fd += v1[i]*v2[i];
  return(fd);
}
```

Matrix-vector product

What should you use to implement this?



Matrix-vector product

Fundamental issue

How do we partition the data?

- By rows;
- By columns;
- In a 2D arrangement