Parallel Computing

Exercise 2

Andres Rodriguez, 30th April 2015

Homework 1 - Remember

✓ **Deadline**

    30.04.2015 - 11:59:pm

✓ **E-mail**

    Andres Rodriguez
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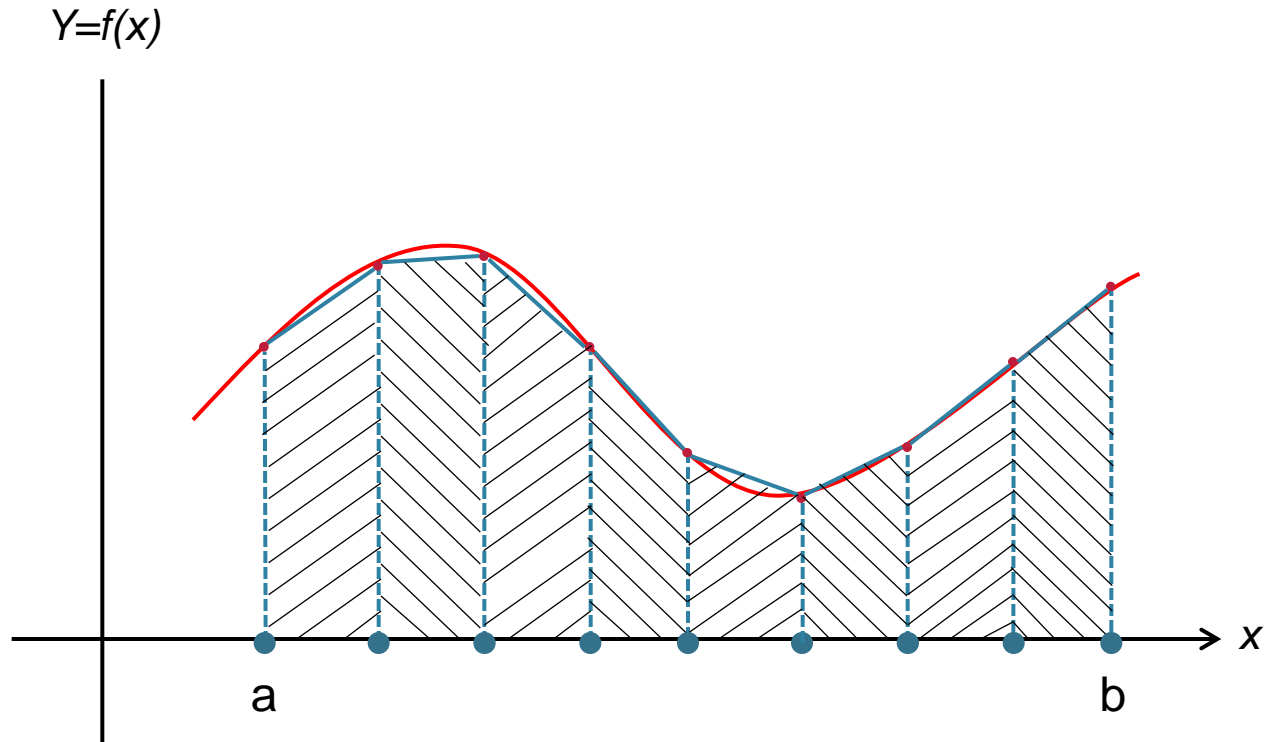✓ **Content**

    ZIP file including   - Source code
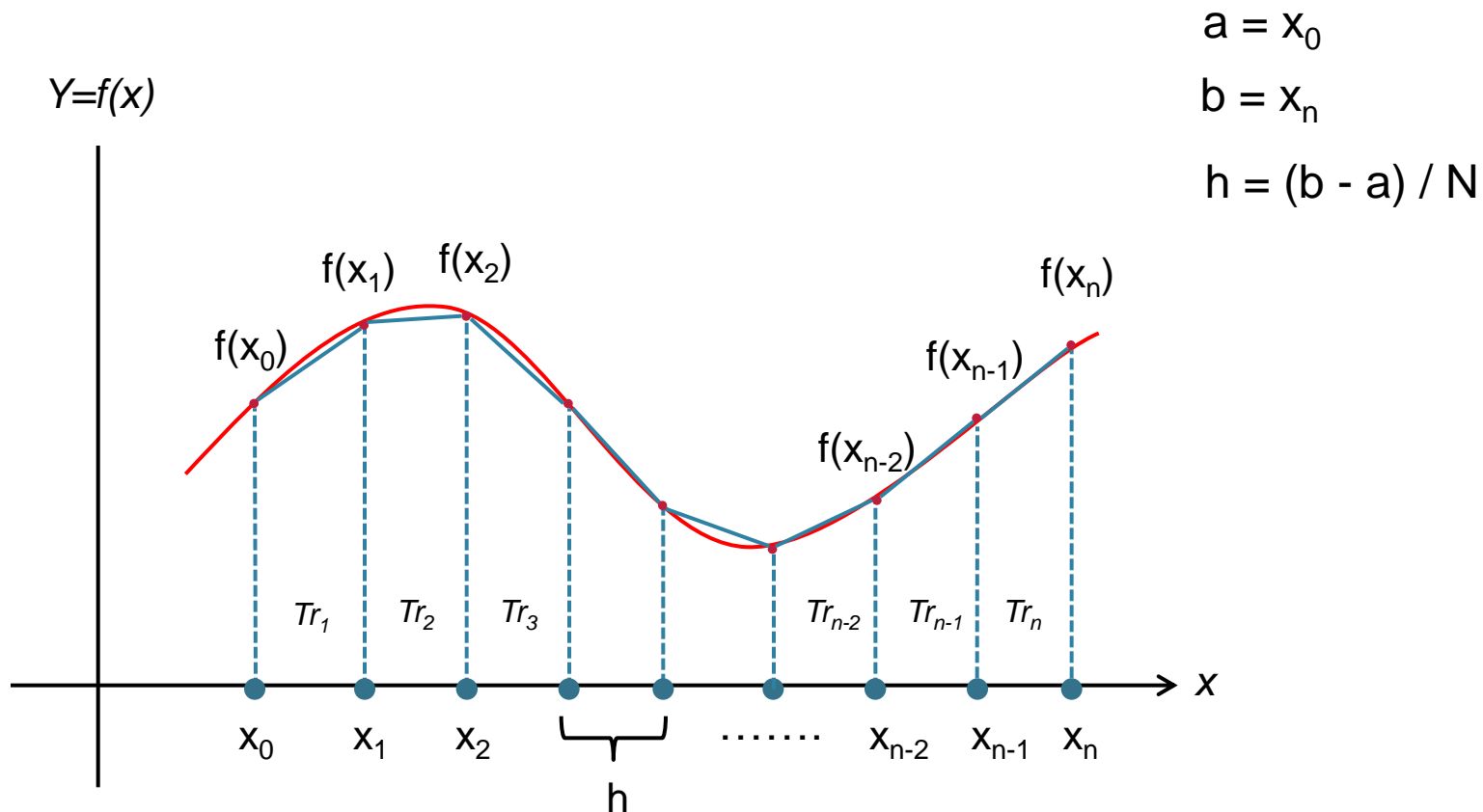   - Written report as *.pdf file
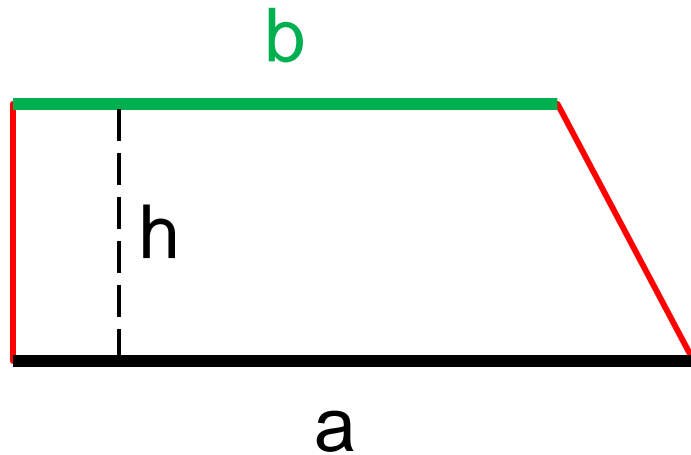
Remember

Next Monday 4th of April is Exercise

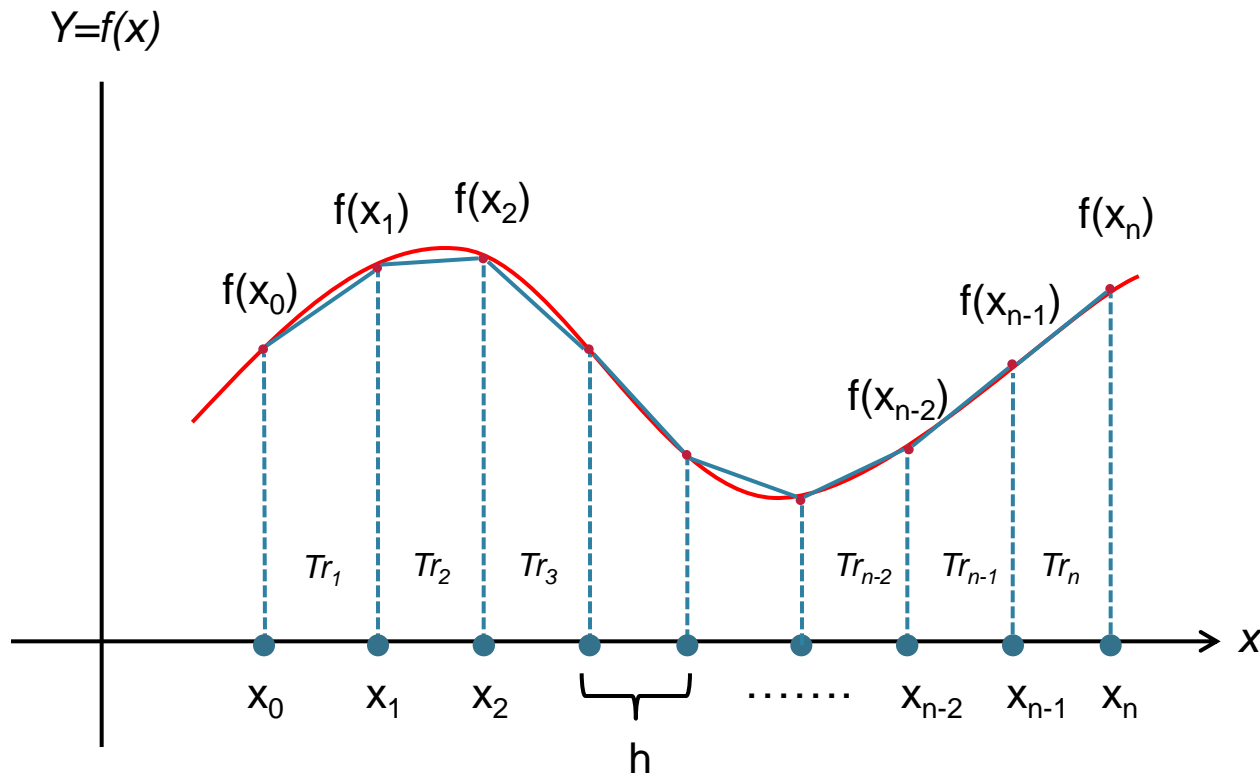# Definite Integral – Trapezoidal Rule

Definite Integral – Trapezoidal Rule

$a = x_0$

$b = x_n$

$h = (b - a) / N$

$Y=f(x)$

$f(x_1)$ $f(x_2)$

$f(x_n)$

$f(x_0)$

$f(x_{n-1})$

$f(x_{n-2})$

Tr_1 Tr_2 Tr_3

Tr_{n-2} Tr_{n-1} Tr_n

x

x_0 x_1 x_2 . . . . x_{n-2} x_{n-1} x_n

h

Area of a Trapezoid

b

h

a

$$A = \frac{1}{2}(a+b) * h$$

Definite Integral – Trapezoidal Rule

$Y=f(x)$

$f(x_1)$ $f(x_2)$ $f(x_n)$

$f(x_0)$

$f(x_{n-1})$

$f(x_{n-2})$

$a = x_0$

$b = x_n$

$h = (b - a) / N$

Tr_1 Tr_2 Tr_3 Tr_{n-2} Tr_{n-1} Tr_n

x_0 x_1 x_2 .... x_{n-2} x_{n-1} x_n

h

$$\int_a^b f(\mathrm{x})\,\mathrm{dx} = Tr_0 + Tr_1 + \ldots + Tr_{n-1} + Tr_n$$

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Definite Integral – Trapezoidal Rule

$Y=f(x)$

f(x_1) f(x_2)

f(x_0)

f(x_n)

f(x_{n-1})

f(x_{n-2})

$a = x_0$

$b = x_n$

$h = (b - a) / N$

Tr_1 Tr_2 Tr_3 Tr_{n-2} Tr_{n-1} Tr_n

x

x_0 x_1 x_2 .... x_{n-2} x_{n-1} x_n

h

$$\int_a^b f(\mathrm{x})\,\mathrm{d}\mathrm{x} = \frac{1}{2}(f(x_0)+f(x_1))*\mathrm{h} + \frac{1}{2}(f(x_1)+f(x_2))*\mathrm{h} + ... + \frac{1}{2}(f(x_{n-2})+f(x_{n-1}))*\mathrm{h} + \frac{1}{2}(f(x_{n-1})+f(x_n))*\mathrm{h}$$

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Definite Integral – Trapezoidal Rule
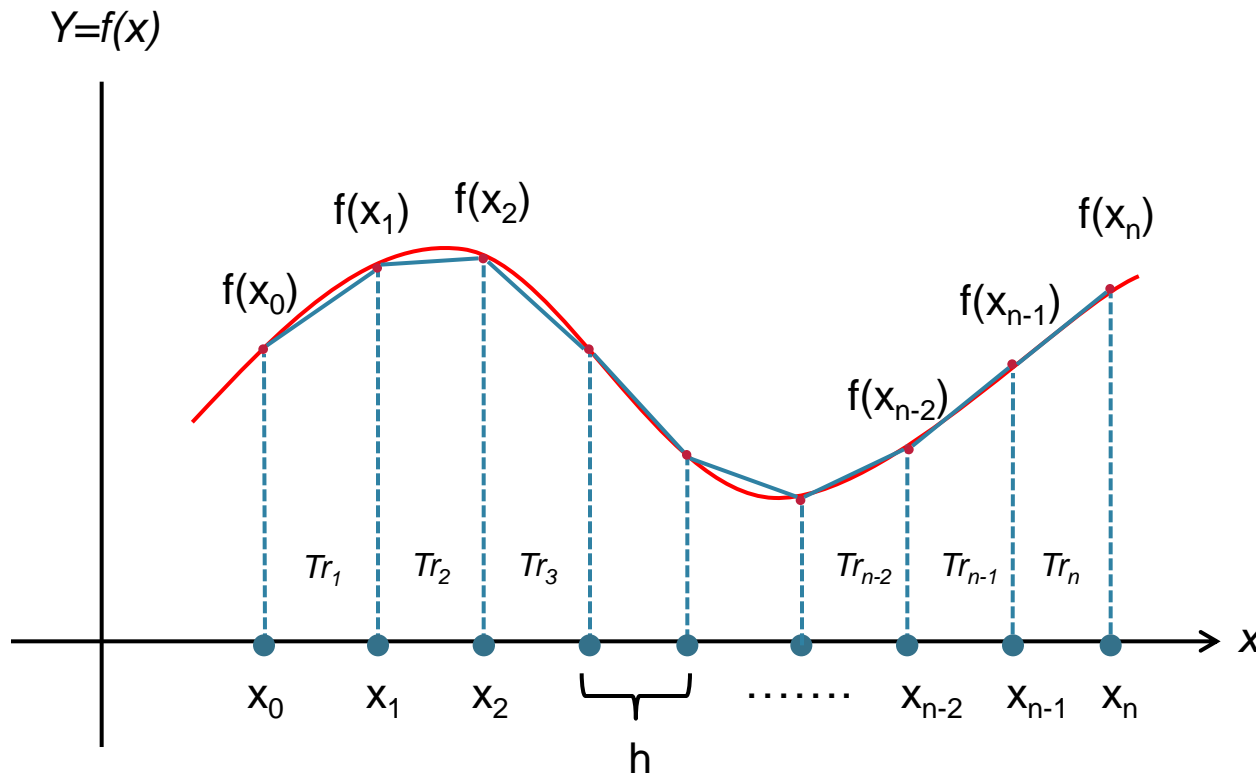
$a = x_0$

$b = x_n$

$h = (b - a) / N$

$$\int_a^b f(\mathrm{x})\,\mathrm{dx} = h * [\frac{1}{2} f(x_0) + f(x_1) + f(x_2) + ... + f(x_{n-2}) + f(x_{n-1}) + \frac{1}{2} f(x_n)]$$

Definite Integral – Trapezoidal Rule
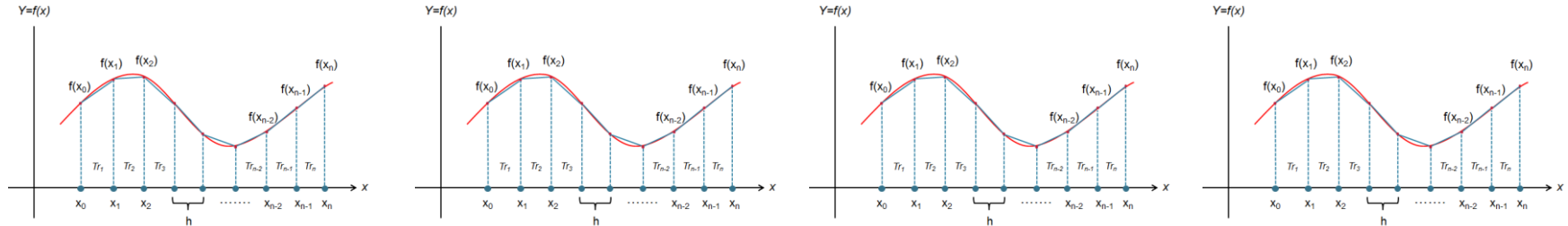
Th = num of threads

Interval [a,b] is fragmented in *Th* sub intervals

Trapezoid in f(x) = N

Number of points in x = N-1

Number of points in x per thread = (N-1)/Th

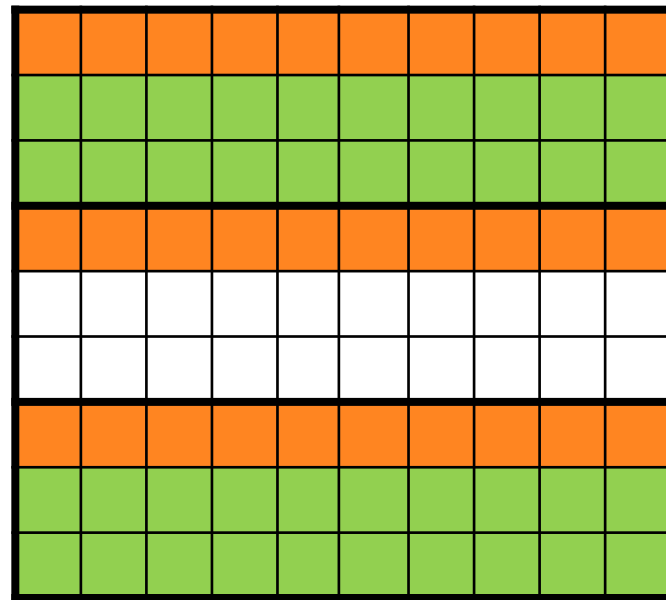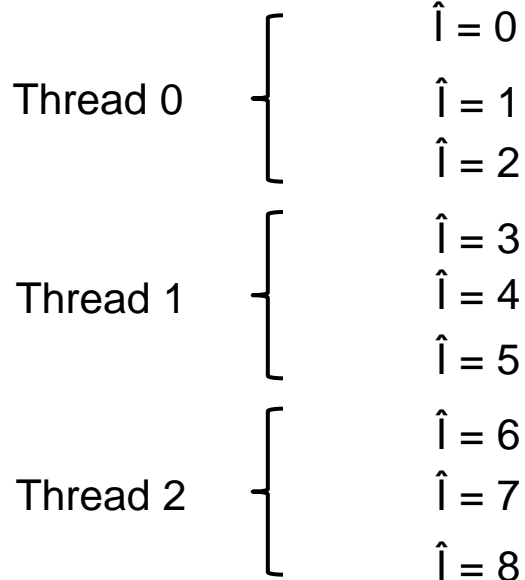$$\int_a^e = \int_a^b + \int_b^c + \int_c^d + \int_d^e$$
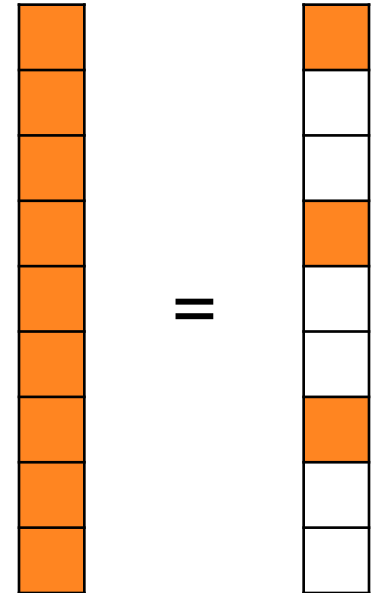
OpenMP - Implementation

Matrix-Vector Multiplication

OpenMP - Implementation