POLITECNICO DI MILANO
MULTIMEDIA INTERNET (part 1)
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July 1, 2014

COGNOME (family name)	
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MATRICOLA	

Exercise 1.

Consider a network of three schedulers.

Scheduler 1 is an EDF scheduler, with three service categories, numbered 1, 2, and 3. The input traffic flows in categories 1, 2, and 3 are $X_1(t)$, $X_2(t)$, and $X_3(t)$, respectively. The service deadlines of the service categories 1, 2, and 3 are δ_1, δ_2, and δ_3, respectively.

Scheduler 2 is a GPS scheduler with three service priorities numbered 1, 2, and 3. The input traffic flows in categories 1, 2, and 3 are $Y_1(t)$, $Y_2(t)$, and $Y_3(t)$, respectively. The weights of service categories 1, 2 and 3 are w_1, w_2, and w_3, respectively.

The flow $X_3(t)$, at the output of scheduler 1, is denoted as $Z_1(t)$.

The flow $Y_3(t)$, at the output of scheduler 2, is denoted as $Z_2(t)$.

The traffic flows $Z_1(t)$ and $Z_2(t)$ are offered to the third scheduler (scheduler 3).

Scheduler 3 is a Strict Priority scheduler with 2 service priorities, numbered 1 and 2. The traffic flow $Z_1(t)$ is served with priority 1, and the traffic flow $Z_2(t)$ is served with priority 2.

The capacity of scheduler 3 is C.

Calculate the probability that the delay of the traffic flow $Z2(t)$ is larger than d in scheduler 3.

$X_1(t)$: r_1, b_1, H_1
$X_2(t)$: r_2, b_2, H_2
$X_3(t)$: r_3, b_3, H_3
$Y_1(t)$: r_4, b_4, H_4
$Y_2(t)$: r_5, b_5, H_5
$Y_3(t)$: r_6, b_6, H_6

$r_1 = 2.0 \times 10^6$ (bit/s)	$b_1 = 0.35 \times 10^6$ (bit)	$H_1 = 0.7$
$r_2 = 0.5 \times 10^6$ (bit/s)	$b_2 = 0.4 \times 10^6$ (bit)	$H_2 = 0.6$
$r_3 = 1.5 \times 10^6$ (bit/s)	$b_3 = 1.0 \times 10^6$ (bit)	$H_3 = 0.8$
$r_4 = 1.0 \times 10^6$ (bit/s)	$b_4 = 1.0 \times 10^6$ (bit)	$H_4 = 0.9$
$r_5 = 1.0 \times 10^6$ (bit/s)	$b_5 = 1.0 \times 10^6$ (bit)	$H_5 = 0.8$
$r_6 = 1.0 \times 10^6$ (bit/s)	$b_6 = 1.0 \times 10^6$ (bit)	$H_6 = 0.88$

$w_1 = 0.3$	$w_2 = 0.5$	$w_3 = 0.2$
$\delta_1 = 0.6$	$\delta_2 = 0.6$	$\delta_3 = 0.6$

$C = 8 \times 10^6$ (bit/s) $d = 0.05$ (s)

Exercise 2.

A FIFO scheduler with capacity C receives N_1 short-range-dependent flows, where each flow has parameters r, b. It receives also N_2 long-range-dependent flows, where each flow has parameters ρ, β, H.

Write the $\alpha(t)$ function to calculate P($D>d$), using the symbolic values of the parameters.

Exercise 3.
Describe how the Two-Rate Three Color Marker works.

POLITECNICO DI MILANO
MULTIMEDIA INTERNET (part 2)
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Exercise 1.

1. Describe the Softswitch architecture.
2. List the signaling protocols used by the Softswitch architecture.
3. Explain how these protocols interact to set up an interworked connection.

Exercise 2.

1. Descibe the structure of SIP messages.
2. Explain the function of the Via headers.
3. Explai the function of the Record Route headers

Exercise 3.
Explain the differences and similarities between the IP TV service and the Internet TV service.

Exercise 4.
Explain how it is possible to implement a scalable architecture to find resources (contents) in a peer-to-peer system.