We will wait 10 minutes until 10:40 AM for all students to join into the meeting.

We will start the tutorial at **10:40 AM**.

CS 3SD3 - Concurrent Systems Tutorial 7

Mahdee Jodayree

November 02, 2021

Before we continue.

❖During the presentation, Students can ask any slide-related questions.

❖Any non-slide-related questions must be asked at the end of the presentation.
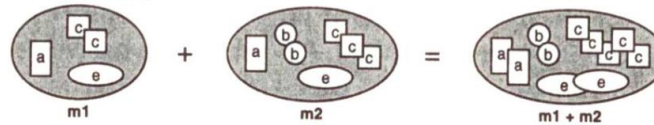
Outline

❖Announcements / Reminders

❖Colored Petri nets

Announcements

❖ Mid-terms will be marked by the end of next week.

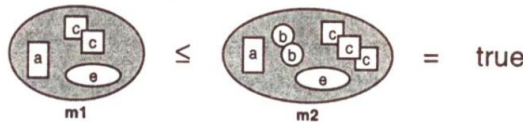# From lecture 9, multisets

Some Operations on Multisets
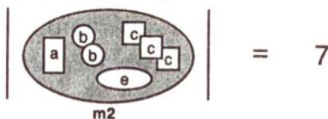
Addition (element-wise)
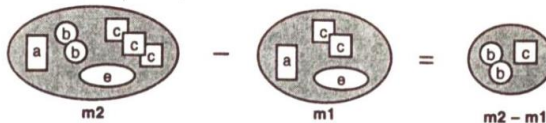
Scalar multiplication (element-wise)

Comparison (element-wise)

Size (number of elements)

Subtraction (only if m2 ≥ m1)
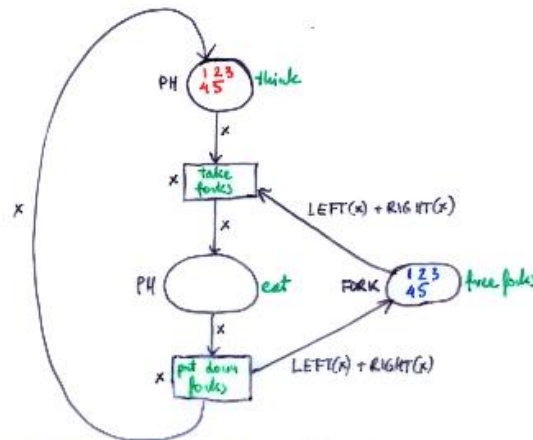
From Lecture 9 notes

Coloured Petri Nets

$$\text{colour } PH = \text{with } ph1 \mid ph2 \mid ph3 \mid ph4 \mid ph5$$
$$\text{colour } Fork = \text{with } f1 \mid f2 \mid f3 \mid f4 \mid f5$$
$$LEFT : PH \rightarrow FORK, \quad RIGHT : PH \rightarrow FORK$$
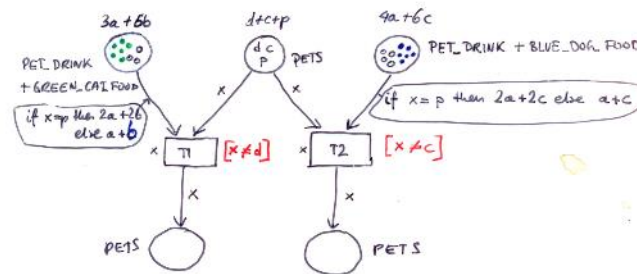$$\text{var } x : PH$$
$$\text{fun } LEFT\ x = \text{case of } ph1 \Rightarrow f2 \mid ph2 \Rightarrow f3 \mid ph3 \Rightarrow f4 \mid$$
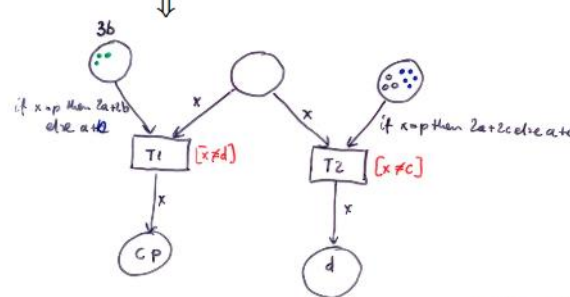$$ph4 \Rightarrow f5 \mid ph5 \Rightarrow f1$$
$$\text{fun } RIGHT\ x = \text{case of } ph1 \Rightarrow f1 \mid ph2 \Rightarrow f2 \mid ph3 \Rightarrow f3 \mid$$
$$ph4 \Rightarrow f4 \mid ph5 \Rightarrow f5$$

Ryszard Janicki   **Deadlock**   23/34

From Lecture 9 notes

colour PET_DRINK = with a;
colour GREEN_CAT_FOOD = with b;
colour BLUE_DOG_FOOD = with c;
colour PETS = with dog | cat | pig
var x : PETS;

Firing occurrence: $(T1, x = c) + (T1, x = p) + (T2, x = d)$
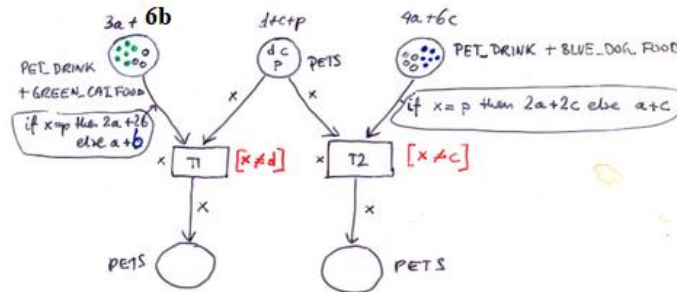
A pig can eat both cat food and dog food <mark>and drink</mark>
<mark>each pig eats 2 units of food and drinks</mark>
<mark>Cats can eat cat food and drink</mark>
<mark>Dogs can eat dog food and drink</mark>

<mark>d: represents dog</mark>

<mark>c: is very confusing because it represents both</mark> **dog food** and **cat**

From Lecture 9 notes

Pig can eat both cat food and dog food and drink
each pig each 2 units of food and drinks
Cats can eat cat food and drink
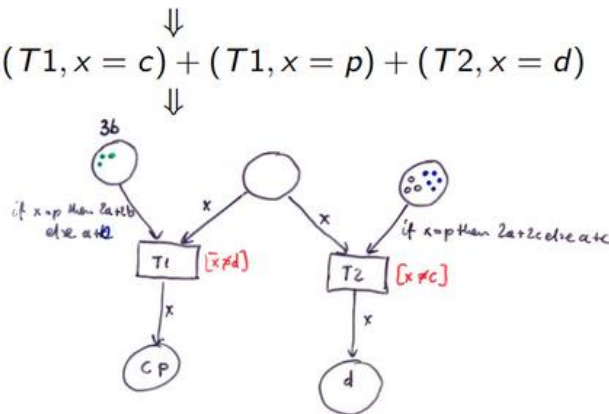Dogs can eat dog food and drink
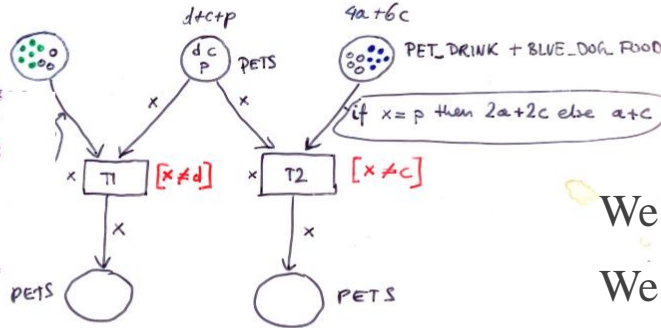
d: represents dog

c: is very confusing because it represents both **dog food** and **cat**

colour PET_DRINK = with a;
colour $GREEN\_CAT\_FOOD$ = with b;
colour $BLUE\_DOG\_FOOD$ = with c;
colour $PETS$ = with dog | cat | pig   (pig eats both cat food and dog food)
var x : $PETS$;

a: represents drink
c: dog food
b: cat foor

We have 6 green color = 6 Cat food = **6b**

We have 3 drinks   = 3 drinks   = **3c**

Dogs cannot eat anything here (there are no dog foods x cannot be equal to d .   Cat and pig will come to T1 to eat but dog will go to T2 to eat

But remember Pigs eat 2 units of foods and 2 units of drinks.

6 Cat food - 1 cat eating - 1 pig (eating 2 units of food) =   6-1-2 = 3 b (cat food left)

3 drinks - 1 cat drinking - 1pig drinking 2 units =
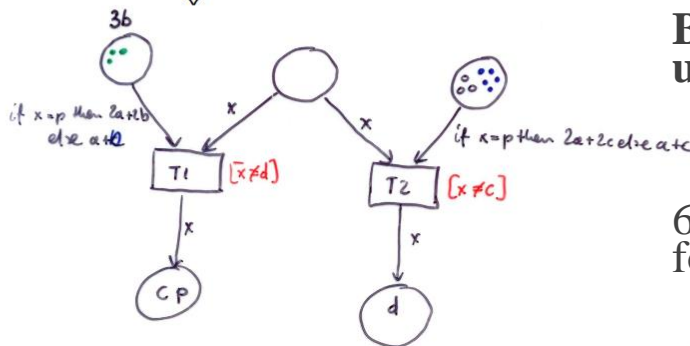
3-1-2=0a No drinks left

We have 6 green color = 6 Cat food = **6b**
We have 3 drinks   = 3 drinks   = **3c**
Dogs cannot eat anything here (there are no dog foods x cannot be equal to d .   Cat and pig will come to T1 to eat but dog will go to T2 to eat
But remember Pigs eat 2 units of foods and units of drinks.

6 Cat food - 1 cat eating - 1 pig (eating 2 units of food) =   6-1-2 = 3 b (cat food left)

3 drinks - 1 cat drinking - 1pig drinking 2 units = 3-1-2=0a No drinks left

Firing occurrence: $(T1, x = c) + (T1, x = p) + (T2, x = d)$

Any Questions?