Business Processes Modelling

MPB (6 cfu, 295AA)

Roberto Bruni
http://www.di.unipi.it/~bruni

20 - Workflow modules
Object

We study Workflow modules to model interaction between workflows

Ch.6 of Business Process Management: Concepts, Languages, Architectures
Problem

Not all tasks of a workflow net are automatic:
they can be triggered manually or by a message
they can be used to trigger other tasks

How do we represent this?
Implicit interaction

Separately developed processes

Some activities can **input** messages (symbol ?)

Some activities can **output** messages (symbol !)
Interface

Seller has an interface for interaction

It consists of some input places and some output places
From Workflow nets to Workflow modules

Assume the original workflow net has been validated:

it is a sound (and maybe safe) workflow net

When we add the (places in the) interface
it is no longer a workflow net!
It becomes a workflow module
Workflow Modules

Definition: A workflow module consists of

a (sound) workflow net \((P,T,F)\)

plus a set \(P^I\) of incoming places
plus a set of incoming arcs \(F^I \subseteq (P^I \times T)\)

plus a set \(P^O\) of outgoing places
plus a set of outgoing arcs \(F^O \subseteq (T \times P^O)\)

such that each transition in \(T\) has
at most one arc to places in the interface \(P^I \cup P^O\)
Workflow module: example
Structural compatibility

A set of workflow modules is called **structurally compatible** if

for every message that can be sent
there is exactly a module who can receive it,
and

for every message that can be received
there is exactly a module who can send it

(formats of message data are assumed to match)
Compatibility
Interaction

Auctioning Service

Seller
Problem

We have added places and arcs to single wf nets
We have joined places of different wf modules

How do we check that the system behaves well?

What has this check to do with WF net soundness?
Workflow systems
Workflow system

Auctioning Service

!rec_accept
!rec_reject

Seller

ra
ra

?rec_reject
?rec_accept

sa
sa

?accept
?reject

sr
sr

!reject
!accept

?accept

?reject

Workflow system
Workflow system

Definition: A workflow system is a wf net that consists of a set of $n$ structurally compatible wf modules (initial places $i_1,...,i_n$, final places $o_1,...,o_n$)

plus an initial place $i$
and a transition $t_i$ from $i$ to $i_1,...,i_n$

plus a final place $o$
and a transition $t_o$ from $o_1,...,o_n$ to $o$

whose initial marking is $i$
Soundness of workflow systems

A workflow system is just an ordinary workflow net

We can check its soundness as usual
Example

Is the wf system sound?
Example

not sound!
Example

Is the wf system sound?
Example
Exercise

Compose the two wf modules and check soundness
Exercise

Compose the two wf modules and check soundness
Weak soundness
Problem

When checking behavioural compatibility
the soundness of the overall net
is a too restrictive requirement

Workflow modules are designed separately,
possibly reused in several systems
It is unlikely that every functionality they offer is
involved in each system
Problem

**Definition**: A workflow net is *weak sound* if it satisfies “option to complete” and “proper completion” (dead tasks are allowed)

Weak soundness can be checked on the RG

It guarantees deadlock freedom and proper termination of all modules
Sound + Sound = ?
Sound + Sound = not sound
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Dead tasks!
Sound + Sound = not sound

Weak Sound!