Business Processes Modelling

MPB (6 cfu, 295AA)

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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 !)

Diagram: Seller (receives a suggestion, sends a decision)
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 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 has at most one connection to places in the interface
Interface
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

Auctioning Service

!rec_accept
!rec_reject

?accept
?reject

Seller

?rec_reject
?rec_accept

!reject
!accept

sending
!

receiving
?
Interaction
Problem

We have added places and arcs to single nets
We have joined places of different nets
We have paired their initial markings

How do we check that the system behaves well?

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

Definition: A workflow system consists of

a set of $n$ structurally compatible workflow modules
(initial places $i_1, \ldots, i_n$, final places $o_1, \ldots, o_n$)

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

plus a final place $o$
and a transition $t_o$ from $o_1, \ldots, o_n$ to $o$
Soundness of workflow systems

A workflow system is just an ordinary workflow net

We can check its soundness as usual
Example

Is the system sound?
Example
Example

Is the system sound?
Example
Exercise

Compose the system modules and check soundness
Exercise

Compose the system 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!
Exercise: Check Weak Soundness of The Assembly
Exercise: Check Again After Refactoring Contractor