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Distribution and Redistribution of End-to-End QoS in Service Oriented Computing

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Outline



- **Background**
- **Distribution of end-to-end QoS**
- **Redistribution of end-to-end QoS**
- **Open issues**

I. Background



■ Basic assumptions

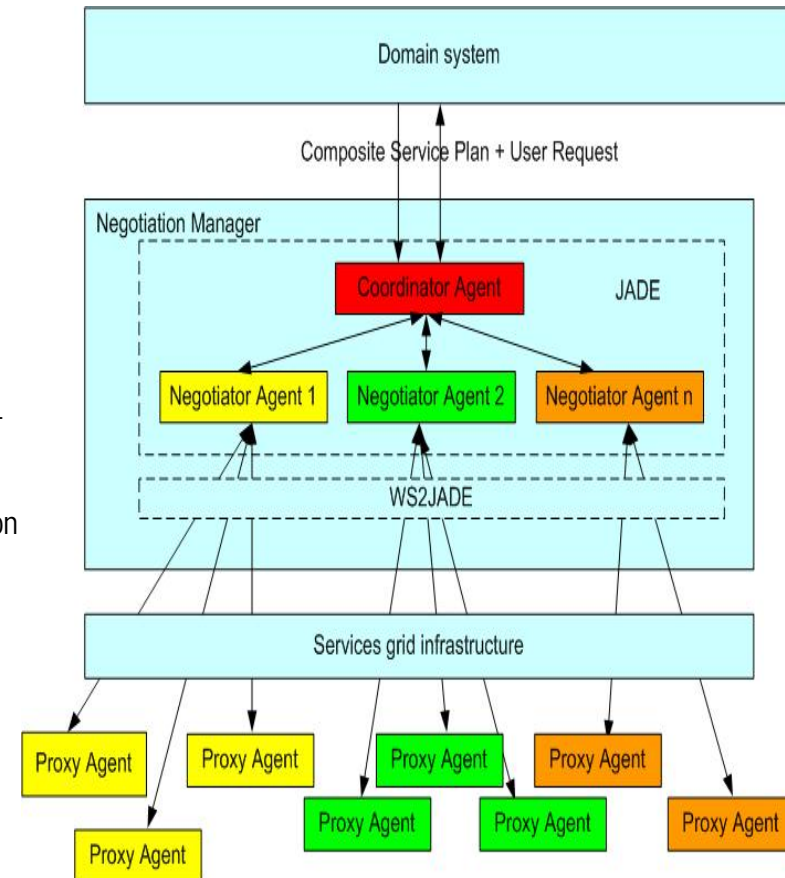
- A customer requests ASAPM to provide a composed service with the following end-to-end QoS requirements: $Cost < s$ and $Duration < t$
- Assume that the composed service = 1th atomic service + 2th atomic services + ... + nth atomic services

■ The purpose of service composition negotiation and re-negotiation

- Coordinated service level agreement (SLA) negotiation with potential service providers in order to satisfy the end-to-end non-functional requirements of the user request collectively
- Selection of the best combination for contracting, based on the agreed SLA values
- SLA re-negotiation and/or provider re-selection in case of service failure and quality of service (QoS) violation in order to satisfy the original user request

■ Challenging topics

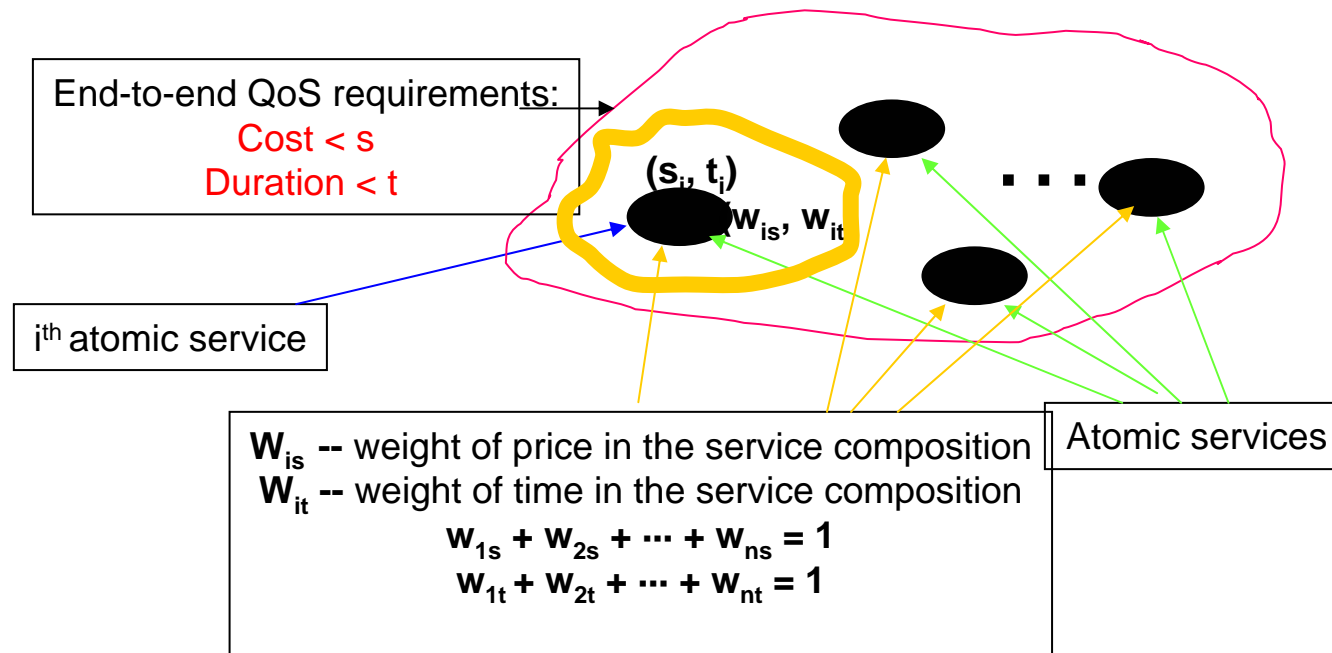
- Distribution of end-to-end QoS
- Redistribution of end-to-end QoS



II. Distribution of end-to-end QoS



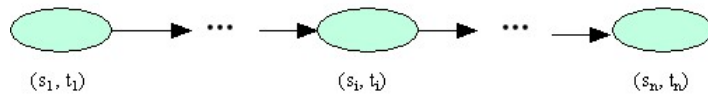
- Introduce the weights of price and time for all atomic services in the service composition
- Use w_{is} and w_{it} to represent the importance of price s and time t for the best- proposal (s_i, t_i) providing to the i^{th} atomic service



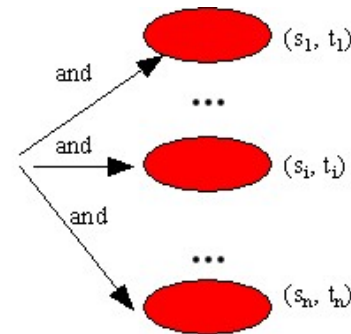
II. Distribution of end-to-end QoS



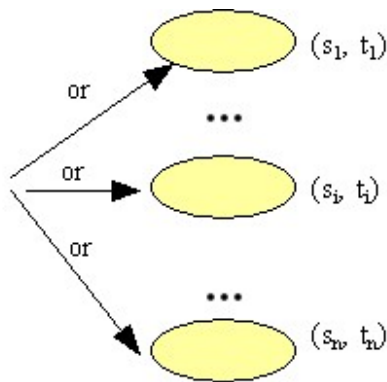
- Introduce three workflow patterns and their combinations (see an example)



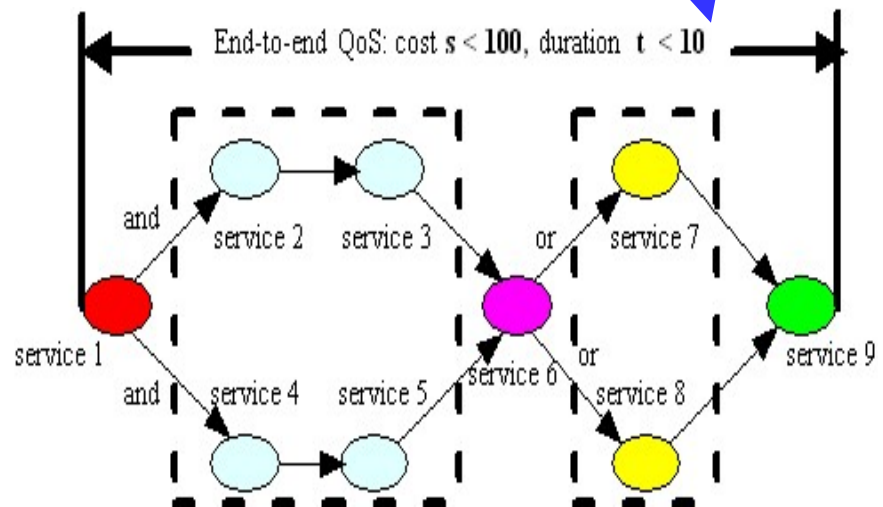
(a) Workflow pattern (atomic services are executed in sequence)



(b) Workflow pattern (all atomic services are executed simultaneously)



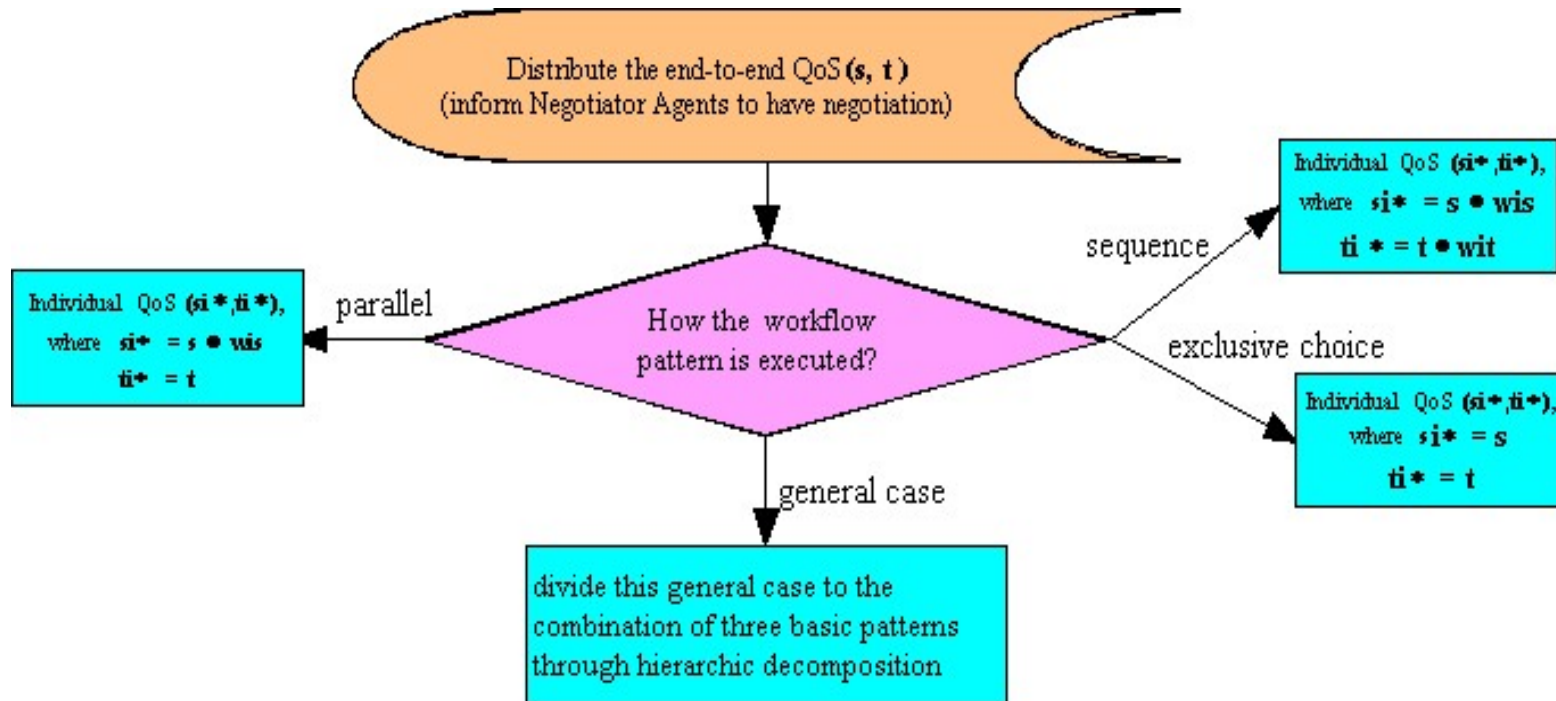
(c) Workflow pattern (one of the atomic services is executed)



II. Distribution of end-to-end QoS



- Distribution of end-to-end QoS will be based on the weights of negotiation attributes for all atomic services in the service composition, the three workflow patterns and their combinations

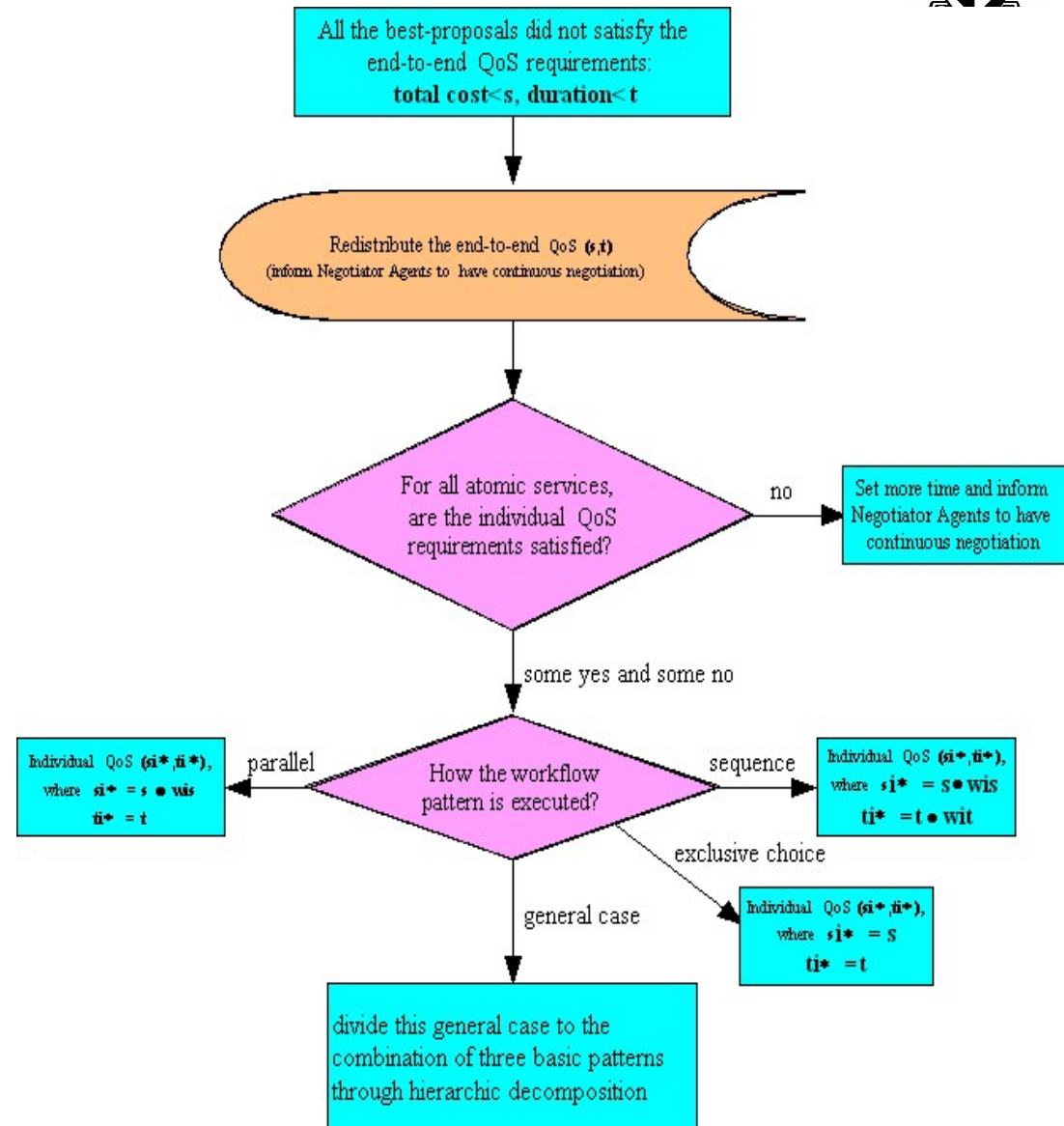


- The weights for distribution of end-to-end QoS will be set based on the best knowledge we already have or the customer's requirements and expected goals (initially)

III. Re-distribution of end-to-end QoS



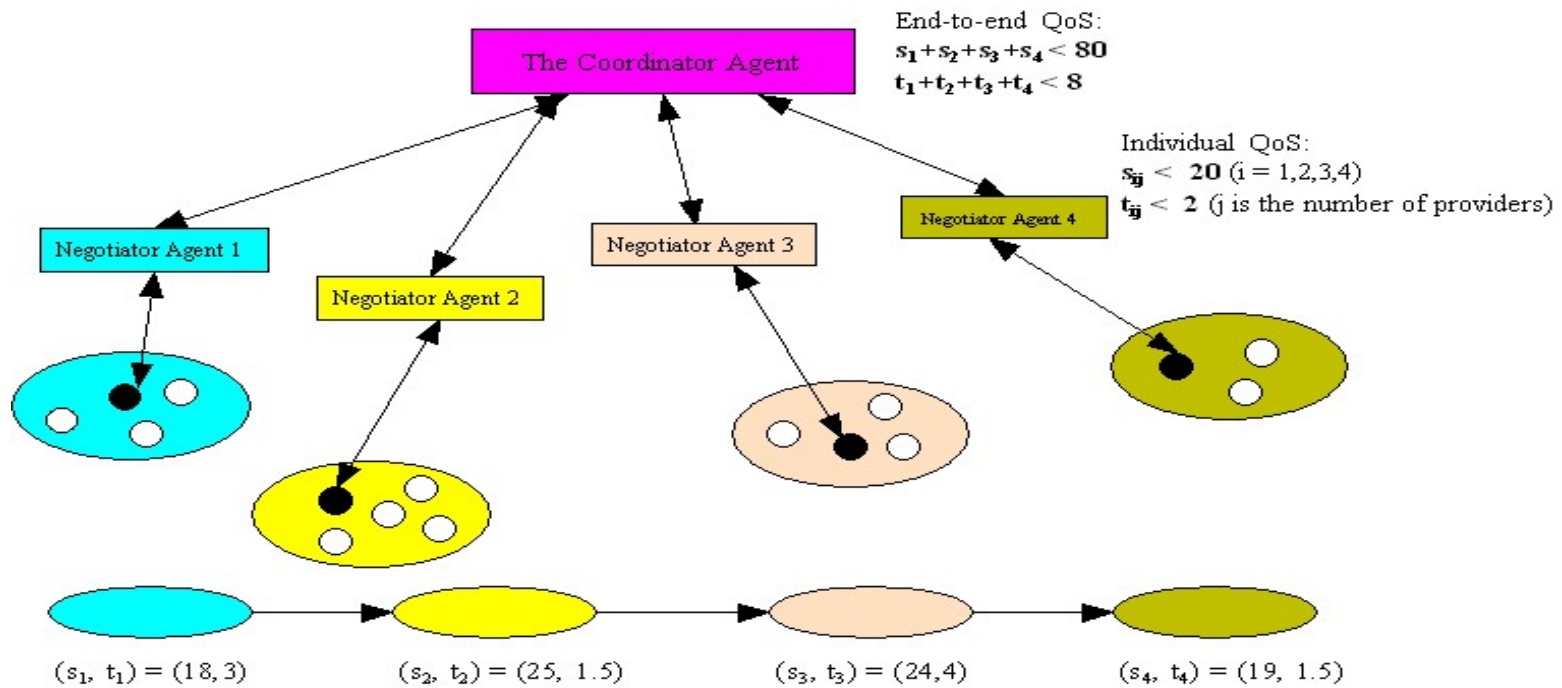
- **Redistribute the end-to-end QoS if all the best-proposals in the service composition did not satisfy the end-to-end QoS requirements**
- **Such redistribution of end-to-end QoS will be based on the weights of price and time for all atomic services in the service composition, the three workflow patterns and their combinations**



III. Re-distribution of end-to-end QoS



- The weights (w_{is}, w_{it}) ($i = 1, 2, \dots, n$) will be calculated by the formulae:
 $w_{is} = s_i / (s_1 + s_2 + \dots + s_n)$, $w_{it} = t_i / (t_1 + t_2 + \dots + t_n)$, where (s_i, t_i) is the last-round best-proposal that Negotiator Agent i chosen from many providers.



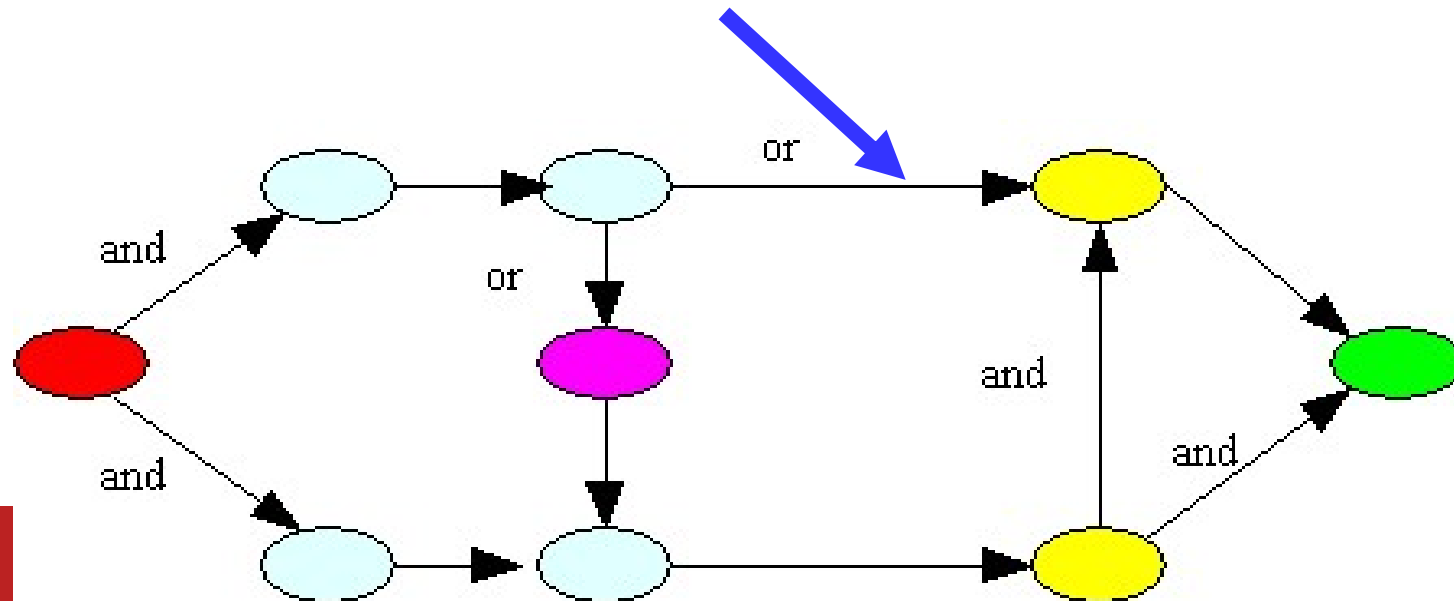
$$w_{1s} = 18 / (18 + 25 + 24 + 24 + 19) = 18 / 86 = 9 / 43, \quad w_{1t} = 3 / (3 + 1.5 + 4 + 1) = 3 / 10$$

$$s_{1*} = 9 / 43 \cdot 80 = 720 / 43 = 16.7, \quad t_{1*} = 3 / 10 \cdot 8 = 24 / 10 = 2.4$$

Open issues (call for ideas!)



- How to define (more effectively) the initial weights of price and time for all atomic services in the service composition in the distribution of end-to-end QoS?
- How to calculate (more effective) the weights of price and time for all atomic services in the service composition when redistributing end-to-to QoS?
- How to distribute and redistribute the end-to-end QoS in more complex workflow patterns?



Any questions?

