



LSDIS

Large Scale Distributed Information Systems



University of Georgia
Computer Science Department

Toward Integrating Social Trust into Web Service Compositions

Sharon Paradesi, Prashant Doshi

LSDIS lab

Department of Computer Science

The University of Georgia

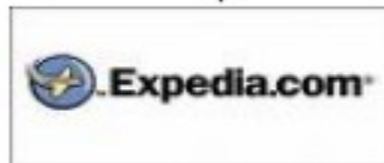


Introduction - Example of Web service compositions

booking()
preBooking()
postBooking()

reservation()
cancelation()
modification()

reservation()
cancellation()
modification()





Trust Model

*Definition: Trust of a requester, B , on a Web service, w , is the confidence of B on w 's **competency**, **reliability** and **honesty**, which will make B depend on w to perform the actions on which B 's welfare depends, even though negative consequences are possible.*

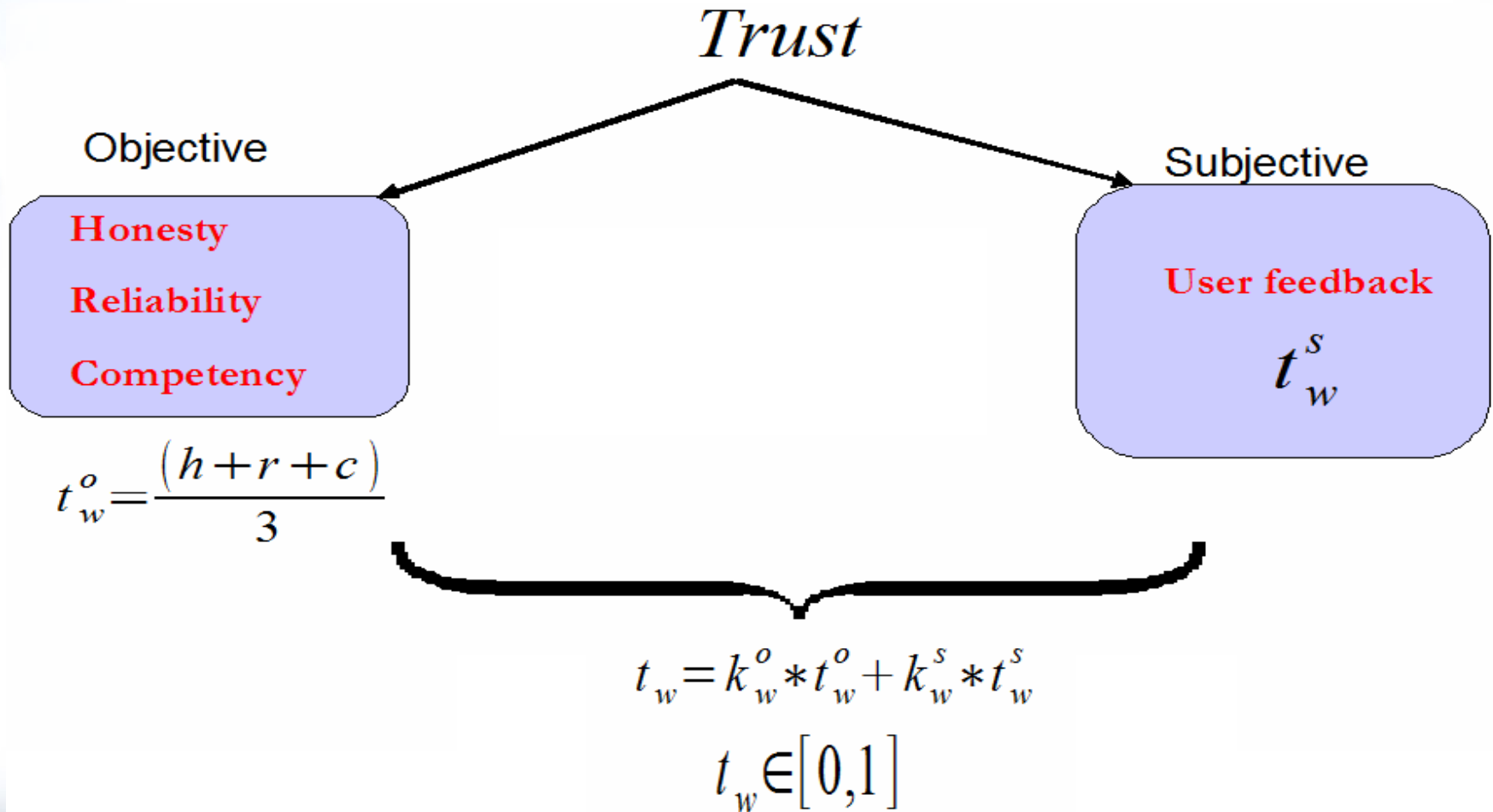
Competency: $c = \langle 1, \text{if all goals are satisfied} \mid 0, \text{otherwise} \rangle$

Reliability: $r = 1 - \text{service failure}$

Honesty: $h = 1 - \left(\frac{|A_m - A_d| + |\bar{R}_m - \bar{R}_d|}{2} \right)$



Trust Model Contd.

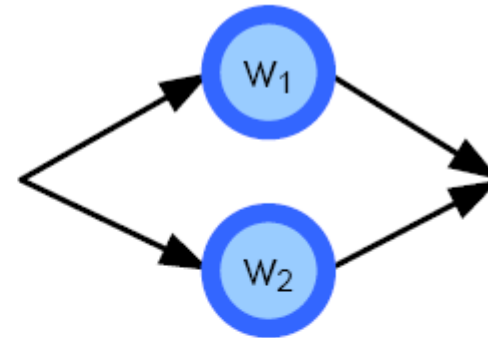




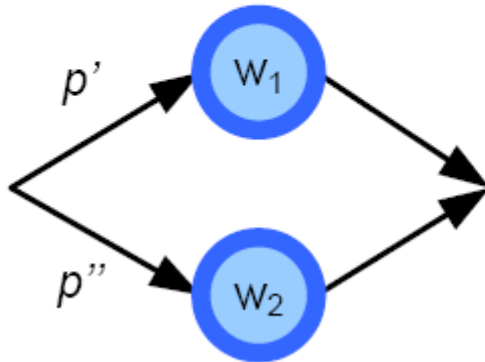
Aggregate Trust over Web Service Compositions



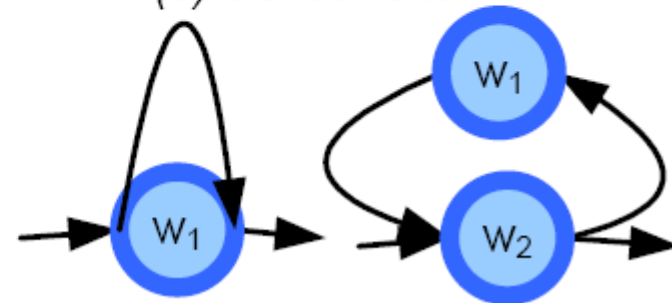
(a) Sequence



(b) Concurrent



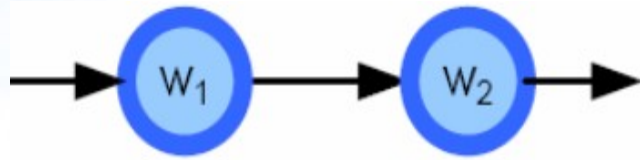
(c) Conditional



(d) Loops



Aggregate Trust over Web service compositions



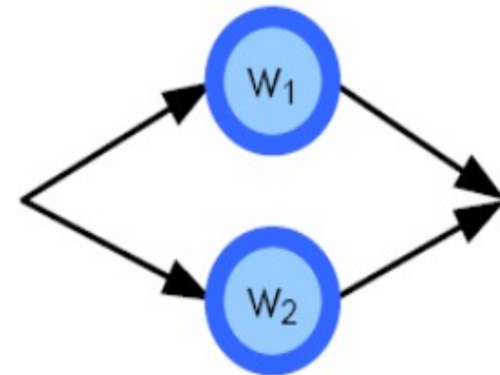
(a) Sequence

$$r_{cw} = \prod_{(i=1)}^n r_{wi}$$

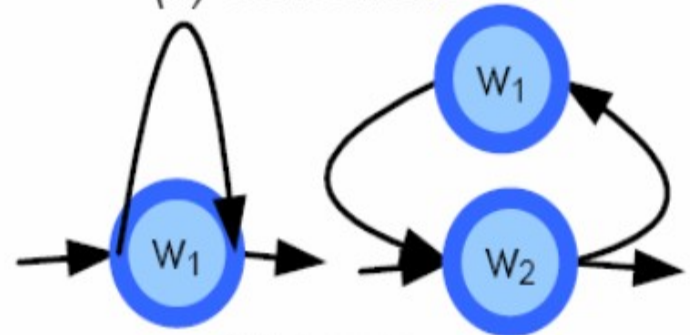
$$h_{cw} = \frac{\sum_{(i=1)}^n h_{wi}}{n}$$

$$c = \langle 1, \text{if all goals of all services are satisfied} | 0, \text{otherwise} \rangle$$

$$t_{cw}^o = \frac{(h_{cw} + r_{cw} + c_{cw})}{3}$$



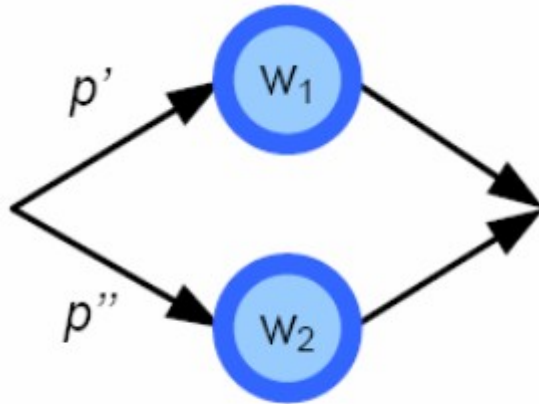
(b) Concurrent



(d) Loops



Aggregate Trust over Web service compositions

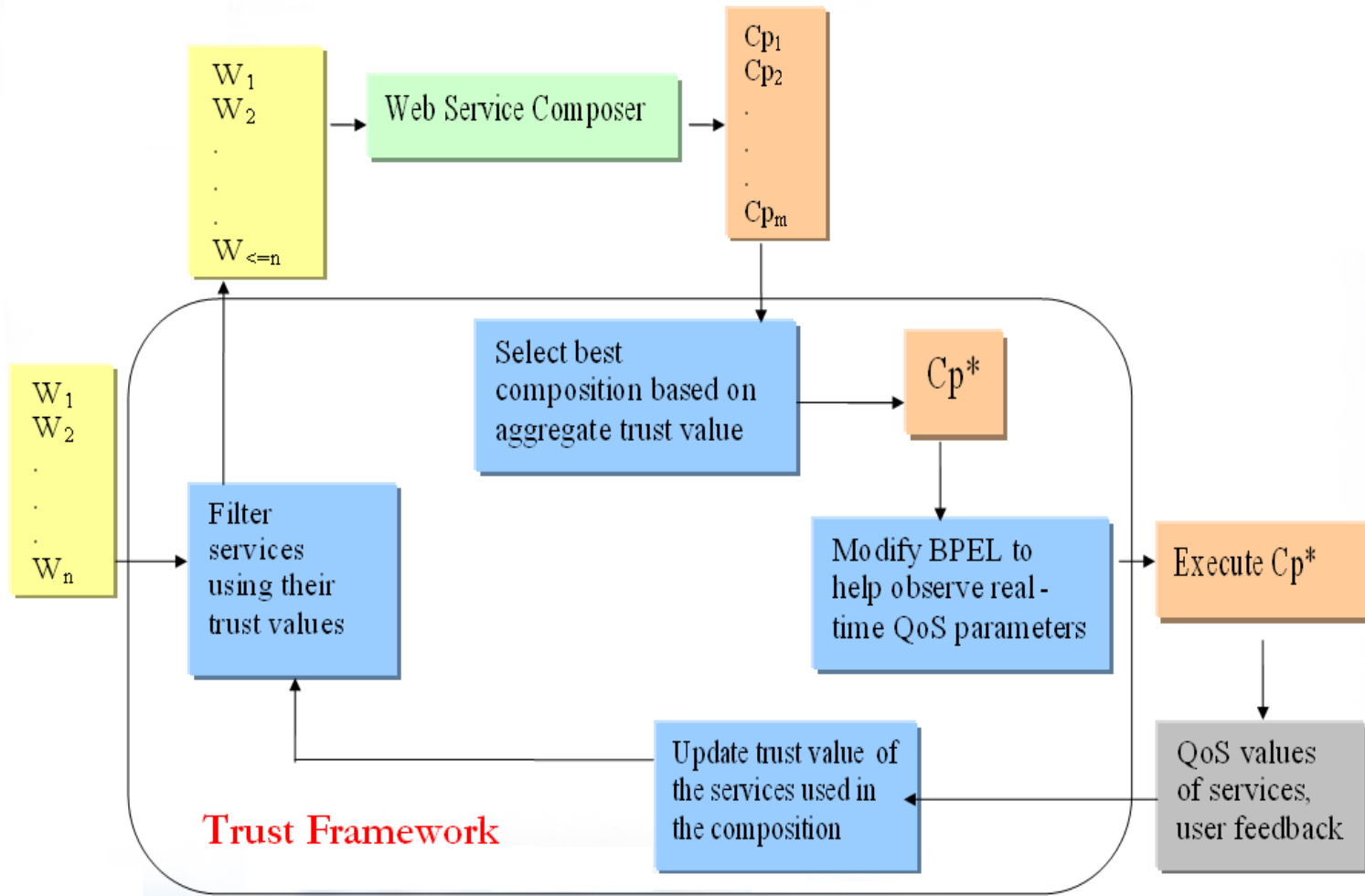


(c) Conditional

$$t_{cw}^o = \sum_{(i=1)}^n p_i * t_{wi}$$



Trust Framework - System Architecture





Experimental Setup

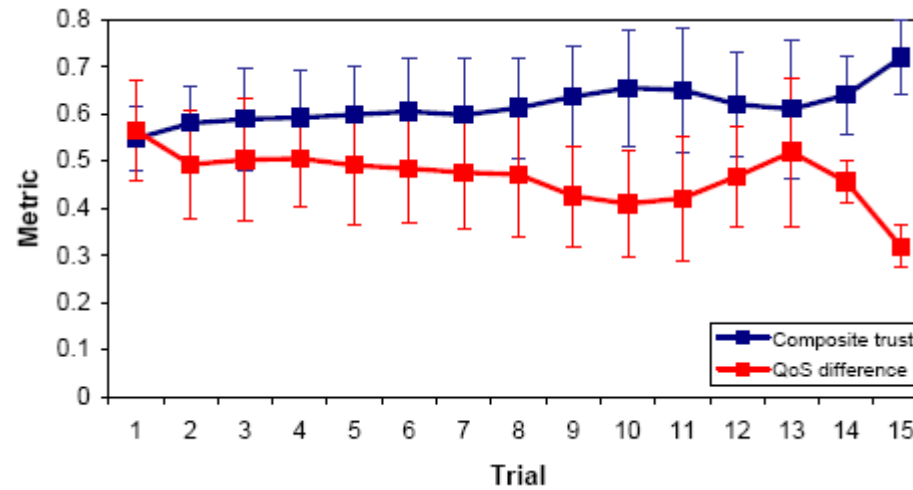
Objective: To validate the utility of our trust framework.

Setup:

- 18 3-step sequential and loop compositions with a choice of 2-3 Web services each.
- Executed 15 trials, averaged over 80 iterations where each composition was run 4 times.



Experimental Results



Composite QoS differences and Trust across trials



Recent Developments - Modified Trust Model

Limitation of original model:

*Difference between **no opinion** and **uncertainty** is not considered.*

Solved by using a triple $\langle t, d, u \rangle$



Modified Trust Model - Contd.

Trust Triple:

$$t_i = \frac{r}{r+s} C_i(B); \quad d_i = \frac{s}{r+s} C_i(B); \quad u_i = (1 - (t_i + d_i))$$

Certainty:

$$C_i(B) = \frac{1}{2 \beta(a,b)} \int_0^1 |p_i^{a-1} (1 - p_i)^{b-1} - 1| dp_i$$



Conclusion

Developed a preliminary framework for integrating trust considerations in Web service compositions.

Future Work

- Vary the importance of the past experiences in updating beliefs.
- Integrate the reputation of users who provide the subjective feedback.
- Investigate the scalability of our framework.



Thank you

Questions?