

Web Service Competition: A New Approach to Service Selection





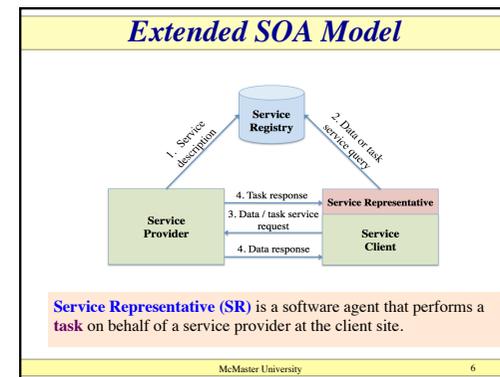
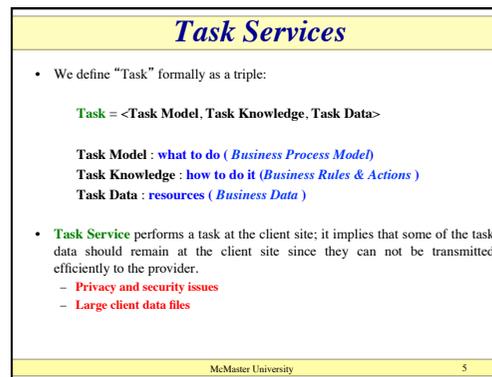
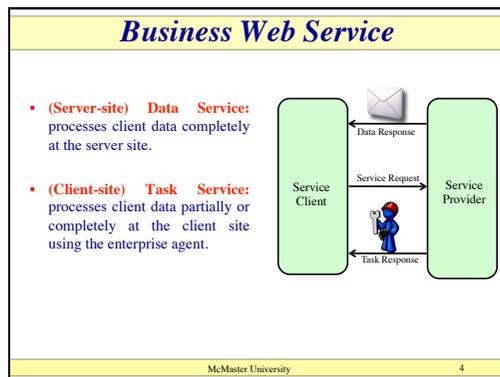
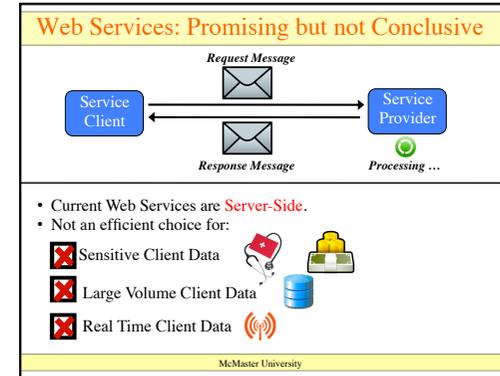
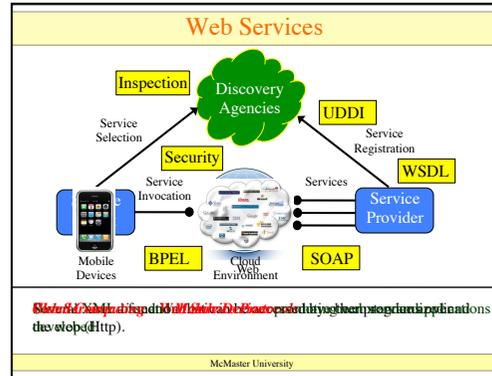
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Motivations – Service Discovery

1. Service descriptions that are provided by service providers *may not be trustable or accurate enough*.
2. Service descriptions are usually *expressed globally* while service features such as performance and accuracy are different for different clients, depending on their needs and contexts.
3. Less well-known services are *not given an opportunity* to show their features.
4. Service features *vary with different measures* and are obtained under different situations. Therefore they cannot be simply and fairly compared, based only on their descriptions.

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Web Service Competition

High level view of the proposed web service competition.

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Service Competition Desk

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WS-Competition Architecture

The competition desk holds a competition among the service representatives of the candidate services using the test cases and policies submitted by the client.

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Service Representatives

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Task Service Competition

Candidate Services

Skin Detection Web Service
WS (image) -> (filtered image)

1. Pixel-based SD
2. Block-based SD (using color features)
3. Block-based SD (using texture features)

Test Cases

(image, expected result)

Competition Policies

$$Accuracy = Average\left(\frac{Points_{Correct}}{Points_{Total}}\right)$$

$$Time = Average(Response\ Time)$$

Experiment 1	
Factor	Weight
Accuracy	0.9
Time	0.1

Experiment 2	
Factor	Weight
Accuracy	0.8
Time	0.2

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Task Service Competition - Results

Competition Results					Evaluation Results				
No	Competition Factor	Pixel WS	Block-Color WS	Block-Texture WS	No	Competition Factor	Pixel WS	Block-Color WS	Block-Texture WS
	Accuracy	91%	85%	89%		Accuracy	88%	81%	85%
1	Time (msec)	829	2071	2979	1	Time (msec)	823	2012	3020
	Score	0.92	0.79	0.82		Score	0.89	0.77	0.77
	Rank	1	3	2		Rank	1	2	2
2	Accuracy	67%	85%	86%	2	Accuracy	64%	85%	81%
	Time (msec)	837	2004	3709		Time (msec)	817	2051	3631
	Score	0.73	0.76	0.71		Score	0.71	0.76	0.69
	Rank	3	1	2		Rank	2	1	3

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Data Service Competition

Candidate Services
Face Recognizer Web Service

WS (face1, ..., target face) -> (Yes/No, confidence)

1. PCA-FR
2. ICA-FR
3. LDA-FR
4. SVM-FR
5. NN-FR

Test Cases
(face₁, ..., target face, expected result)

Known Face

Target Face



Competition Policies

$$Accuracy = \frac{|S|}{|Test Cases|}$$

$$Confidence = \frac{\sum_{i \in S} conf_i}{|Test Cases|}$$

Time = Average(Response Time)

Factor	Weight
Accuracy	0.5
Confidence	0.3
Time	0.2

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Data Service Competition - Results

Competition Results							Evaluation Results						
No	Competition Factor	PCA WS	ICA WS	LDA WS	SVM WS	NN WS	No	Competition Factor	PCA WS	ICA WS	LDA WS	SVM WS	NN WS
	Accuracy	60%	80%	40%	80%	40%		Accuracy	57%	72%	42%	68%	33%
	Confidence	38%	66%	16%	61%	12%		Confidence	31%	39%	19%	38%	12%
1	Time (msec)	1060	2404	1012	6214	2605	1	Time (msec)	1720	2411	1123	6094	2889
	Score	0.53	0.69	0.44	0.61	0.31		Score	0.51	0.59	0.46	0.19	0.29
	Rank	3	1	4	2	5		Rank	3	1	4	2	5
	Accuracy	80%	100%	100%	100%	60%		Accuracy	76%	89%	92%	88%	64%
	Confidence	40%	69%	87%	71%	39%		Confidence	39%	61%	79%	64%	37%
2	Time (msec)	2237	2673	1148	8519	3012	2	Time (msec)	2325	3103	1059	8618	2097
	Score	0.64	0.78	0.96	0.73	0.48		Score	0.59	0.69	0.89	0.65	0.53
	Rank	1	2	1	3	5		Rank	3	2	1	4	5
	Accuracy	60%	80%	60%	80%	60%		Accuracy	52%	77%	57%	69%	51%
	Confidence	43%	68%	41%	48%	29%		Confidence	26%	59%	31%	47%	26%
3	Time (msec)	2023	2803	1129	7147	2078	3	Time (msec)	2051	2526	1145	6985	2106
	Score	0.54	0.68	0.63	0.37	0.48		Score	0.44	0.65	0.39	0.54	0.45
	Rank	4	1	2	3	4		Rank	5	1	2	3	4

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- ### Discussions
1. The proposed web service competition does not intend to replace the traditional web service selection approaches.
 2. Service competition can not be offered free of charge for the pay-by-use services because of costs associated with tests of the competition desk. However, some services provide free trials or test versions of their web services which can be used by the competition desk.
 3. The competition desk can be provided as a web service search engine where the service client sends a query request including the category of services as well as the search criteria (competition factors).
 4. The introduction of an actor in the SOA model and the associated tests may increase the required time for service selection. However, in most of the cases, service selection includes a long-term agreement between the service client and the service provider.
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