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SC2 SC3 SC4 SC1 MО FL n k **Bell's Number:** 15 4 5 52 number of ways n components can be k: 6 203 distributed across containers 7 877 8 4.140 9 21,147 n ... M: Tomcat ApplicationServer D: Postgresql DB F: nginx file server L: Log server (Codebeamer)

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SERVERLESS COMPUTING

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amazon

L7.24





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FAAS PLATFORMS - 2
 New cloud platform for hosting application code
 Every cloud vendor provides their own:

 AWS Lambda, Azure Functions, Google Cloud Functions, IBM OpenWhisk
 Similar to platform-as-a-service
 Replace opensource web container (e.g. Apache Tomcat) with abstracted vendor-provided black-box environment
 Itsistic influence for Cloud Computing (rel 2019) USE Sol of Engineering and Technology, University of Washington-Tacoma

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Cloud native (FaaS) software architecture requires external services/components				
		Example: Weather Application		
2	Client	Lambda is triggered	J 2	
	···• III	() 	···	
53		API GATEWAY	DYNAMODB	
int-end code for weather app hosted in 53	User clicks on link to get local weather information	App makes REST API call to endpoint	Lambda runs code to retrieve local weather information and returns data back to user	

PRICING OBFUSCATION				
VM pricing:	hourly rental pricing, billed to nearest second is intuitive			
FaaS pricin	<u>g:</u>			
	AWS Lambda Pricing			
FREE TIER:	first 1,000,000 function calls/month \rightarrow FREE first 400 GB-sec/month \rightarrow FREE			
Afterwards:	\$0.0000002 per request			
	\$0.00000208 to rent 128MB / 100-ms			
October 16, 2019	TCSSS62: Software Engineering for Cloud Computing [fall 2019] School of Engineering and Technology University of Machineton, Taroma			

MEMORY RESERVATION QUES Lambda memory ▼ Basic settings reserved for functions Ul provides "slider bar" to set function's memory allocation Resource capacity (CPU, disk, network) coupled to Performance slider bar: "every **doubling** of memory, doubles CPU.... But how much memory do model services require? TCSS562: Software Engineering for Cloud Computing [Fall 2019] School of Engineering and Technology, University of Washington - Tacoma October 16, 2019 L7.45

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 PRIVATE CLOUD

 • Compute clusters class cloud

 • Open source frameworks:

 • Openstack:

 • https://www.openstack.org/

 • https://www.openstack.org/

 • https://www.openstack.org/

 • https://cloudstack:

 • https://cloudstack.apache.org/

 • Nimbus:

 • http://www.nimbusproject.org/

 • Various virtualization hypervisors:

 Opensource: XEN, KVM Commercial: VMWare, etc.

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