8TH EDITION

SERVICE-ORIENTED COMPUTING AND SYSTEM INTEGRATION SOFTWARE

IOT, BIG DATA, AND AI AS SERVICES

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Answer Keys

Contents

1.7 Exercises and Projects

Name: _____

Date: _____

1. Multiple choice questions. Choose one answer in each question only. Choose the best answer if multiple answers are acceptable.

1.1

(A) Latency is zero.
(B) Bandwidth is infinite.
(C) The network is secure.
(D) Topology does not change.
(E) All of them are fallacies.

1.2

(A) service provider and the service broker.
(B) service requester and the service broker.
(C) Yellow Pages and the Green Pages.
(D) producer and the consumer.

1.3

(A) Client-server architecture
(B) CORBA
(C) Service-oriented architecture
(D) DCOM

1.4

(A) Service-oriented architecture
(B) Service-oriented computing
(C) Service-oriented software development
(D) Object-oriented programming

1.5

(A) Service provider
(B) Service broker
(C) Application builder
(D) End user of software

1.6

(A) SOA software has better modularity.
(B) SOA software does not require code-level integration among the services.
(C) DOA software has better reusability.
(D) DOA software better supports cross-language integration.

1.7

(A) BPEL
(B) Choreography
(C) Orchestration
(D) Code integration

1.8

(A) an object-oriented programming language.
(B) a service-oriented programming language.
(C) a database programming language.
(D) a standard for data representation.

1.9

(A) XML (B) SOAP (C) WSDL (D) UDDI

1.10

(A) Software as operational services.

(B) Users are treated as codevelopers.

(C) Use loosely coupled and easy-to-use services to compose applications.

(D) Use services and data from multiple external sources to create new services and applications.

(E) All of the above.

1.11

(A) web to desktop.

(B) service orientation to object orientation.

(C) desktop to web.

(D) Web 2.0 to Web 3.0.

1.12

(A) Infrastructure as a service

(B) Platform as a service

(C) Programming language as a service

(D) Software as a service

Name: _____

Date: _____

2.9 Exercises and Projects

1. Multiple choice questions. Choose one answer in each question only. Choose the best answer if multiple answers are acceptable.

1.1

(A) is a synonym for a method.

(B) is an antonym for a method.

(C) exists after the corresponding code is compiled.

(D) exists when the corresponding code is running.

1.2

(A) deadlock.

(B) livelock.

(C) starvation.

(D) the dining philosophers problem.

1.3

(A) Add a random delay before writing back the account balance.

(B) Implement a lock mechanism to prevent simultaneous access.

(C) Make sure a single withdrawal does not exceed half of the limit.

(D) Anyone of the above will work.

1.4

(A) Livelock is a synonym of deadlock.

(B) Livelock is a deadlock-resolving technique.

(C) In the case of deadlock, the resources are held. In the case of livelock, the resources are still free.

(D) In the case of livelock, the resources are held. In the case of deadlock, the resources are still free.

1.5

(A) "blocked" state.

(B) "sleep" state.

(C) "ready" state.

(D) "waiting" state.

(E) All states above.

1.6

(A) None

(B) One exactly

(C) Two exactly

(D) Many

1.7

(A) the entire method only, similar to the synchronized method in Java.

(B) the entire class with multiple methods.

(C) a single statement, similar to the synchronized statement in Java.

(D) All statements above are correct.

1.8

(A) exception handling is implied.

(B) an exception can never happen if the lock(…) method is used.

(C) the lock(…) method is used for read-only.

(D) the lock(…) method is used for write-only.

1.9

(A) Monitor.Enter(…);

(B) Monitor.TryEnter(…);

(C) lock(…);

(D) ReaderWriterLock(…);

(E) None of the above

1.10

(A) Monitor.Wait(…);

(B) Monitor.Notify(…);

(C) Monitor.Wake(…);

(D) Monitor.Pulse(…);

(E) All of the above

1.11

(A) Monitor.Enter(…);

(B) Monitor.Exit(…);

(C) lock(…);

(D) ReaderWriterLock(…);

(E) None of the above

1.12

(A) The automatic boxing and unboxing functions will handle the problem correctly.

(B) Manual boxing is required before using the variable as the Monitor methods.

(C) There is no way in which a value type of variable can be synchronized.

(D) ReaderWriterLock has to be used, instead of Monitor methods.

1.13

(A) Yes. Reader/Writer locks do not make unnecessary locking, and they are simpler in their implementations than the Monitor locks.

(B) No. Although Reader/Writer locks do not make unnecessary locking, it takes longer to execute the Reader/Writer locks.

1.14

(A) Mutex allows reader–reader threads to overlap.

(B) Mutex allows conditional entering of an object.

(C) Mutex can be used to synchronize the processes between different applications.

(D) Mutex methods are faster than Monitor methods.

1.15

(A) prevent more processes (or threads) than permitted from accessing a pool of resources.

(B) prevent any two processes (or threads) from accessing a shared resource simultaneously.

(C) replace Mutex, because Mutex is not efficient in execution time.

(D) coordinate the order of executions among the threads.

1.16

(A) prevent more processes (or threads) than permitted from accessing a pool of resources.

(B) prevent any two processes (or threads) from accessing a shared resource simultaneously.

(C) replace Mutex, because Mutex is not efficient in execution time.

(D) coordinate the order of executions among the threads.

1.17

(A) allows interactions between the computer program and the user or the environment.

(B) uses large modules to build an application program.

(C) supports loosely coupled communications between the modules of the program.

(D) does not allow the interruption between two indivisible instructions.

1.18

(A) allows a method name to be passed as a parameter.

(B) allows the same method call to be associated with different methods.

(D) encapsulates a method with a specific signature.

(D) All of the above.

1.19

(A) An event handler is a part of the control flow in its residing class.

(B) An event handler is a part of the control flow in calling class.

(C) An event handler does not belong to the control flow of any class.

(D) All of the above.

1.20

(A) They handle different types of data.

(B) They differ in the way the cells are accessed.

(C) They differ in the architecture style they are used in.

(D) All of the above.

Name: _____

Date: _____

3.10 Exercises and Projects

1. Multiple choice questions. Choose one answer in each question only. Choose the best answer if multiple answers are acceptable.

1.1

(A) Address (B) Binding (C) Client (D) Contract

1.2

(A) Add Reference…
(B) Add Service Reference…
(C) Add Web Reference…
(D) Add WCF Reference…

1.3

(A) Platform-independent communication.

(B) WSDL and RESTful service development.

(C) WS-Security and WS-ReliableMessaging.

(D) All of the above

1.4

(A) exactly the same types of the elements.

(B) few types of the elements.

(C) more types of the elements.

(D) completely different types of the elements.

1.5

(A) Console Application
(B) ASP .Net Website
(C) Workflow Foundation Application
(D) All of the above

1.6

(A) .Net Development Server/IIS Express
(B) IIS
(C) Web server
(D) None of them support external access

1.7

(A) Service registry
(B) Service repository
(C) Service requirement and specification
(D) Application Templates
(E) All of the above

1.8

(A) Service registry
(B) Service repository
(C) Service requirement and specification
(D) Application Templates
(E) All of the above

1.9

(A) Ontology allows more data to be stored.
(B) Ontology allows faster data retrieval.
(C) Ontology can better facilitate service match and discovery.
(D) Ontology can better store executables while databases can better store data.

1.10

(A) It is a part of the White Pages in UDDI.
(B) It is a part of the Yellow Pages in UDDI.
(C) It is a part of the Green Pages in UDDI.
(D) It is a part of all the three Pages in UDDI.

1.11

(A) One exactly.
(B) Two exactly.
(C) Three exactly.
(D) It can have multiple binding templates.

1.12

(A) a synonym of the server broker.
(B) a synonym of the service requester.
(C) the interface of a service that is exposed to outside.
(D) a virtual object in the service requester that creates a channel to a (remote) service.

1.13

(A) a synonym of the server broker.
(B) a synonym of the service requester.
(C) the interface of a service that is exposed to outside.
(D) a virtual object in the service requester that creates a channel to a (remote) service.

1.14

(A) Method name of the remote method.
(B) Code of the remote method.
(C) Parameter list of the remote method.
(D) Return type of the remote method.

1.15

(A) Java programming language itself. (B) Eclipse programming environment.

(C) Axis2. (D) Tomcat.

1.16

(A) Java programming language itself. (B) Eclipse programming environment.

(C) Axis2. (D) Tomcat.

Name: _____

Date: _____

4.8 Exercises and Projects

1. Multiple choice questions. Choose one answer in each question only. Choose the best answer if multiple answers are acceptable.

1.1

(A) There is a unique root element.

(B) Each element is quoted between an open and a closing tag.

(C) There are no overlapped tags.

(D) All of the above.

1.2

(A) complete graph. (B) binary tree.

(C) rooted tree. (D) star structure.

1.3

(A) Between any pair of elements.

(B) Inside the opening tag of an element.

(C) Inside the closing tag of an element.

(D) Before the first element or after the last element.

1.4

(A) CDATA contains nonprintable characters only, while PCDATA contains printable characters only.

(B) PCDATA contains nonprintable characters only, while CDATA contains printable characters only.

(C) CDATA contains digits only, while PCDATA contains letters only.

(D) CDATA will not be checked for syntax errors by XML parsers, while PCDATA will be checked for syntax errors.

1.5

(A) DOM (Document Object Model) (B) SAX (Simple API for XML)

(C) XMLTextReader (D) XMLTextWriter

1.6

(A) XmlDocument class (B) XmlNode class
(C) XmlTextReader class (D) XmlTextWriter Class

1.7

(A) XmlDocument class (B) XmlNode class
(C) XmlTextReader class (D) XmlTextWriter class

1.8

(A) follows XML syntax.
(B) is used to define the structure of an XML file.
(C) is used to define the structure of an XML schema file.
(D) extends the C# XmlDocument class.

1.9

<!ELEMENT instructor (name, course+, officeHours*, phone | email)>
(A) The XML instance file must have an element <course>
(B) The XML instance file must have an element <officeHours>
(C) The XML instance file must have an element <phone>
(D) All of the above

1.10

(A) DTD cannot be used to validate the syntax of XML files.
(B) A DTD file must be embedded in the XML file and cannot be placed externally.
(C) DTD cannot define child elements.
(D) DTD does not follow XML syntax.

1.11

(A) To introduce a new element that has not been defined in other namespaces.
(B) To reduce the number of namespace qualifiers prefixed to the element names.
(C) To define a new type instantly.
(D) To override an existing namespace.

1.12

(A) Atom (B) JSON (C) SOAP (D) XML

1.13

(A) Document Type Definition file (B) XML Schema file
(C) XML instance file (D) XML namespace file

1.14

(A) is always implicitly qualified by the namespace-qualifier of the element.

(B) is implicitly qualified by the default namespace only.

(C) is never implicitly qualified by the qualifier of the element.

(D) (A) and (B).

1.15

(A) an HTML file, but not to another XML file.

(B) another XML file, but the tree structure cannot be changed.

(C) another XML file, with the same or a different structure.

(D) None of the above.

1.16

(A) Input and output of VIPLE applications

(B) Input and output of RESTful services

(C) Input and output of BPEL services

(D) Input and output of assembly language programs

1.17

(A) Three-level tree structure.

(B) Allow autoupdate.

(C) Allow autodiscovery.

(D) Copyright information.

Name: _____

Date: _____

5.8 Exercises and Projects

1. Multiple choice questions. Choose one answer in each question only. Choose the best answer if multiple answers are acceptable.

1.1

(A) Pure HTML with sever support
(B) Client-side scripting
(C) Server-side scripting
(D) Out-of-browser computing

1.2

(A) Pure HTML with sever support
(B) Client-side scripting
(C) Server-side scripting
(D) Out-of-browser computing

1.3

(A) ASAX file (Global)
(B) ASCX file (User controls)
(C) ASPX file (Web form)
(D) ASMX (Web service)

1.4

(A) ASAX file (Global)
(B) ASCX file (User controls)
(C) ASPX file (Web form)
(D) Web.config
(E) DLL file

1.5

(A) ASAX file (Global)
(B) ASCX file (User controls)
(C) ASPX file (Web form)
(D) Web.config
(E) DLL file

1.6

(A) Copy and paste the user control into each ASPX page.
(B) Link the reference to the user control page into each ASPX page.
(C) Once added to the project, a user control is automatically visible to all pages.
(D) The user control must be registered in the Web.config file.

1.7

(A) Pure HTML form
(B) HTML form with embedded scripts written in a scripting language
(C) ASPX page with embedded scripts written in a scripting language
(D) ASPX page with C# programs as event handlers

1.8

(A) (I) and (II).
(B) (I) and (III).
(C) (I) and (IV)
(D) (III) and (IV)

1.9

(A) Copy the class into the Default.aspx page.
(B) Copy the class into the bin folder, and then the class will be visible in all aspx pages.
(C) Use the "Add Reference" option in Visual Studio to include the class.
(D) All of the above.

1.10

(A) int
(B) double
(C) string
(D) object defined by a class

1.11

(A) int
(B) double
(C) string
(D) object defined by a class

1.12

(A) within all pages in the session
(B) across all sessions of the application
(C) in the aspx page, in which the variable is created
(D) in the .cs file, in which the variable is created

1.13

(A) (I) and (II).
(B) (II) and (III).
(C) (III) and (IV)
(D) (II) and (IV)

1.14

(A) all pages in the current session, but not the other sessions in the application.
(B) all sessions in the current application, but not the other applications.
(C) all applications in the web server.
(D) None of the above.

1.15

(A) XML reader class
(B) XML writer class
(C) Path class
(D) FileStream class

1.16

(A) XMLTextReader (Stream based)
(B) XMLDocument (Document tree based)
(C) Both XMLTextReader and XMLDocument
(D) Neither XMLTextReader nor XMLDocument

1.17

(A) It caches the entire XHTML page.
(B) It caches a part of the XHTML page defined by a user control.
(C) It caches any object created by a new() operation in the program.
(D) It caches any output data, such as Label and ListBox in an aspx page.

1.18

(A) It caches the entire XHTML page.
(B) It caches a part of the XHTML page defined by a user control.
(C) It caches any object created by a new() operation in the program.
(D) It caches any output data, such as Label and ListBox in an aspx page.

1.19

(A) Application state variables can save strings only.

(B) Application state variables do not have automated caching management support.

(C) Application state variables need cookies support.

(D) Application state variables cannot be shared among different sessions.

1.20

(A) When you want to insert a new data object into the cache.

(B) When you want to change an expiration time in an existing cache object.

(C) When you want to add a dependency object into an existing cache object.

(D) When you want to retrieve a specific item from an existing cache object.

1.21

(A) The entire web page generated from the ASPX page

(B) The data related to the User Control

(C) Object selected by the developer

(D) All of the above

1.22

(A) Always in the level-one or level-two cache memory of the server

(B) Always in the main memory of the server

(C) Always in the file system of the server

(D) Can be in cache, memory, and disk

1.23

(A) Cache class (B) CacheDependency class

(C) OutputCach class (D) ResponseElement class

1.24

(A) Server control (B) HTML control (C) User control (D) DLL file

1.25

(A) Graphics (B) Bitmap (C) Pen (D) Brushes

Name: _____

Date: _____

6.6 Exercises and Projects

1. Multiple choice questions. Choose one answer in each question only. Choose the best answer if multiple answers are acceptable.

1.1

(A) continuity of service in [0, t].

(B) the readiness of service at time point t.
(C) nonoccurrence of catastrophic consequence.
(D) the validity and consistence of data and message.

1.2

(A) Availability
(B) Confidentiality
(C) Safety
(D) Vulnerability

1.3

(A) Reliability is needed
(B) Confidentiality is needed
(C) Digital signature is needed
(D) All of the above

1.4

(A) Access control list
(B) IP address restrictions
(C) Domain name restrictions
(D) Encrypted HTTP connections
(E) All of the above

1.5

(A) ASAX file (Global)
(B) ASCX file (User controls)
(C) ASPX file (Web form)
(D) Web.config
(E) DLL file

1.6

(A) Passwords are stored in clear text.
(B) Sequential comparisons of username and password.
(C) Unmanageable if accessibility needs to be changed frequently.
(D) All of the above.

1.7

(A) authentication.
(B) authorization.
(C) Both (A) and (B)
(D) Neither (A) nor (B)

1.8

(A) <allow users= “*” />
(B) <deny users= “?” />
(C) <allow users = “Bob” /><deny users = “"*” />
(D) <deny users “"*” /><allow users = “"Bob” />

1.9

(A) one.
(B) two.
(C) three.
(D) four.

1.10

(I) Parity Check
(II) Checksum

(III) Arithmetic Code
(IV) m-of-n Code

(A) (I) and (II)
(B) (II) and (III)
(C) (II) and (IV)
(D) (III) and (IV)

1.11

(A) secret algorithm has been published.
(B) encryption key is short.
(C) algorithm complexity is too high.
(D) code is open source.

1.12

(A) WS-Security
(B) Reliable Sessions (WS-R)
(C) Interoperability (WS-I)
(D) All of the above

1.13

(A) At-Least-Once delivery, At-Most-Once delivery, and Exactly-Once delivery
(B) Guaranteed message ordering for delivery
(C) Both (A) and (B)
(D) None of the above

1.14

(A) in the entire program by default.
(B) defined using an object of TransactionScope class.
(C) quoted by a pair of special of tags < transaction> … </transaction>.
(D) left to the user to write a rollback method that commits the transaction calls simultaneously.

1.15

(A) Data confidentiality
(B) Data integrity
(C) Both (A) and (B)
(D) Neither (A) nor (B)

1.16

(A) Lost messages
(B) Duplicated messages
(C) Messages received out of order
(D) All of the above

Name: _____

Date: _____

7.6 Exercises and Projects

1. Multiple choice questions. Choose one answer in each question only. Choose the best answer if multiple answers are acceptable.

1.1

(A) ServiceMetadataBehavior
(B) ServiceHost
(C) Uri
(D) WsHttpBinding

1.2

(A) WCF class called GenerateProxy.

(B) A class in the Console Application template.

(C) Web Administrative Tool in ASP .Net.

(D) An independent tool called Service Model Metadata Utility Tool.

1.3

(A) Uri baseAddress = new Uri("http://localhost:8000/Service");

(B) ServiceHost selfHost = new ServiceHost(typeof(myService), baseAddress);

(C) selfHost.AddServiceEndpoint(typeof(myInterface), new WSHttpBinding(), "myService");

(D) selfHost.Description.Behaviors.Add(smb);

1.4

(A) Duplex (B) One-way

(C) Request-Reply (D) All of the above

1.5

(A) Duplex (B) One-way

(C) Request-Reply (D) All of the above

1.6

(A) PerCall (B) PerSession (C) Single (D) Reentrant

1.7

(A) PerCall (B) Reentrant (C) Single (D) Multiple

1.8

(A) SOAP (B) TCP/IP (C) MSMQ (D) HTTP

1.9

(A) always corresponds to a single data item.

(B) can correspond to a single item or a set of data items.

(C) always corresponds to a WebMethod.

(D) replaces SOAP in traditional web services.

1.10

(A) rooted tree. (B) binary tree.

(C) B+ tree. (D) red-black tree.

1.11

(A) Communication is stateless.

(B) Communication is based on HTML.

(C) It follows object-oriented computing paradigm.

(D) Each resource is given a unique identifier, called URI.

1.12

(A) RESTful services focus on performing (verb) a task for the client.
(B) RESTful services focus on the result (noun) of performing (verb) a task.
(C) RESTful services are more object-oriented.
(D) RESTful services are used for heavier duty computing.

1.13

(A) Solve computational intensive problems.
(B) Use SOAP for data exchanges.
(C) Focus on data and resources to be exposed.
(D) Focus on WebMethods to be exposed.

1.14

(A) Encoded in XML
(B) Encoded in SOAP
(C) Encoded in WSDL
(D) Encoded in URI

1.15

(A) /append2?x=7&x=12
(B) /append2/7/12
(C) /append2 (x=5, y=12)
(D) /append2 (5, 12)

1.16

(A) Yes
(B) No

1.17

(A) a stateless service, as RESTful services are always stateless.
(B) a stateless service, as there is no need of saving state in the service.
(C) a stateful service that correlates multiple accesses from the same client.
(D) a stateful service, as the dynamic image is cached for performance reasons.

1.18

(A) Canvas
(B) GDI+
(C) SVG
(D) WebGL

1.19

(A) C#
(B) Java
(C) JavaScript
(D) Python

1.20

(A) Model
(B) View
(C) Controller
(D) None of them

1.21

(A) In Model
(B) In View
(C) In Controller
(D) None of them

1.22

(A) In Model (B) In View (C) In Controller (D) None of them

Name: _____

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8.9 Exercises and Projects

1. Multiple choice questions. Choose one answer in each question only. Choose the best answer if multiple answers are acceptable.

1.1

(A) add an additional layer of abstraction in application development.
(B) offer a new service development template.
(C) provide a service hosting environment.
(D) implement application logic in a database.

1.2

(A) XML. (B) XAML. (C) C# (D) JavaScripy

1.3

(A) Workflow-first (B) Interface-first (C) Both of them (D) Neither of them

1.4

(A) Workflow-first (B) Interface-first
(C) Both are the same (D) Neither of them can be used

1.5

(A) Asynchronous (B) Persistent (C) Synchronous (D) None of them

1.6

(A) Each service involved can communicate with multiple partners in the application.
(B) Each service involved must communicate with at least two partners in the application.
(C) Involved services communicate with the central process only.
(D) The process itself is not a service.

1.7

(A) <invoke> (B) <receive>
(C) <assign> (D) All of the above

1.8

(A) A "portType" (B) A "receive" activity
(C) A "reply" activity (D) None of the above

1.9

(A) <scope>
(B) <sequence>
(C) <flow>
(D) <namespace>

1.10

(A) <invoke>
(B) <receive>
(C) <assign>
(D) <copy>

1.11

(A) a set partner link types using XML schema.
(B) a SOAP packet to be transmitted between two web services.
(C) the order of the activities to be performed in a web service.
(D) the WSDL interface of a web service.

1.12

(A) Java
(B) WSDL with extended elements
(C) ebXML
(D) SOAP

1.13

(A) <invoke> from client side and <send> from the server side
(B) <receive> from client side and <reply> from the server side
(C) <invoke> from client side and <invoke> from the server side
(D) All of the above

1.14

(A) BPEL Console
(B) JDeveloper
(C) BPEL Process Manager
(D) ESB

1.15

(A) Activities
(B) Workflows
(C) Both (A) and (B)
(D) Neither (A) nor (B)

1.16

(A) asynchronous and queued message services.
(B) synchronous one-way communication.
(C) synchronous two-way communication.
(D) All of the above.

1.17

(A) URI of RESTful service.
(B) URL of the client.
(C) URL of the server.
(D) subscribing topics or queues.

1.18

(A) SOAP
(B) MSMQ
(C) JMS
(D) WSDL

1.19

(A) Database-based
(B) JMS-based
(C) MSMQ-based
(D) None of the above

1.20

(A) IBM WebSphere
(B) Microsoft BizTalk
(C) Oracle SOA Suite
(D) All of the above

9.7 Exercises and Projects

Name: _____

Date: _____

1. Multiple choice questions. Choose one answer in each question only. Choose the best answer if multiple answers are acceptable.

1.1

(A) Event-driven support
(B) Application is platform independent
(C) Reusable services
(D) All of the above

1.2

(A) All inputs are known at the start of the program.
(B) Many sensory inputs can be better described by events.
(C) Data flow does not exist.
(D) Control flow does not exist.

1.3

(A) Services (B) Service directory (C) Applications (D) All of the above

1.4

(A) Activity (B) Calculate (C) Merge (D) Variable

1.5

(A) It waits for one of the incoming data items to arrive.
(B) It waits for all incoming data items to arrive.
(C) It checks the result of a condition and then chooses one of the incoming data items.
(D) It must be used in pair with Merge.

1.6

(A) If (B) Join (C) For (D) Switch

1.7

(A) Use the triangular output port of the activity.
(B) Use the circular output port of the activity.
(C) Use a Built-in Event.
(D) Use the Custom Event.

1.8

(A) A basic activity
(B) A composite activity
(C) A composite activity wrapped with service interface
(D) A service that can be used as a RESTful service or a WSDL service

1.9

(A) RESTful services (B) WSDL services (C) VIPLE services (D) All of the above

1.10

(A) Lego EV3
(B) Simulated robots
(C) Open architecture robots
(D) All of the above

1.11

(A) Distance sensors (B) Touch sensors (C) Color sensors (D) Motion sensors

1.12

(A) Distance sensors
(B) Touch sensors
(C) Both (A) and (B)
(D) Neither (A) nor (B)

1.13

(A) a set of inputs occurring together at the starting state.
(B) a sequence of inputs occurring one after another.
(C) a set of inputs occurring together at the terminating state.
(D) nonoccurrence of any input.

1.14

(A) It plugs and plays.
(B) A middleware is installed on the robot to generate and interpret VIPLE JSON object.
(C) A DSS service is written to map the device driver to the VIPLE interface.
(D) A USB interface is a part of VIPLE standard and no translation is needed.

1.15

(A) Calculate (B) Join and Merge (C) While (D) All of the above

1.16

(A) Key Press Events (B) Text to Speech (C) Print a Line (D) All of the above

1.17

(A) Wi-Fi (B) Bluetooth (C) WebSocket (D) All of the above

1.18

(A) EV3
(B) Open architecture robot
(C) Both (A) and (B)
(D) Neither (A) nor (B)

1.19

(A) Wi-Fi (B) Bluetooth (C) RS323 (D) All of the above

1.20

(A) Wi-Fi (B) Bluetooth (C) RS323 (D) All the above

10.6 Exercises and Projects

1. Multiple choice questions. Choose one answer in each question only. Choose the best answer if multiple answers are acceptable.

1.1

(A) Support hierarchical structure of data access.
(B) Support device-independent data access from multiple sources.
(C) Make it easier for the data to pass across firewall.
(D) All of the above.

1.2

(A) an array of homogeneous data.
(B) a single table of data.
(C) a set of tables.
(D) a set of data, each of which can have different types.

1.3

(A) Data adapter (B) Data provider (C) DataSet (D) None of them

1.4

(A) an array of homogeneous data.
(B) a single table of data.
(C) a set of tables that can be accessed by indices and as an XML tree.
(D) a set of data, each of which can have different type.

1.5

(A) Insert a column (B) Delete a column
(C) Update a column (D) Select the maximum value from a column

1.6

(A) sequentially access the elements of an aggregate object.
(B) parameterize clients with different requests of actions.
(C) vary the interactions among the different objects independently.
(D) define a one-to-many dependency between objects.

1.7

(A) SqlConnection conn = new SqlConnection;
(B) conn.Open();
(C) SqlCommand cmd = new SqlCornmand();
(D) cmd.Connection = conn;

1.8

(A) Yes (B) No

1.9

(A) group join. (B) join. (C) select. (D) where.

1.10

(A) an aggregate type.
(B) a generic type.
(C) a primary type.
(D) an implicit type to be decided by compiler.

1.11

(A) an aggregate type.
(B) a generic type.
(C) a primary type.
(D) an implicit type to be decided by compiler.

1.12

(A) L (B) Q (C) X (D) Z

1.13

(A) Save XML file as it is.
(B) Support XML schema.
(C) Save semi-structured data.
(D) All of the above.

1.14

(A) Elements and attributes may not be differentiated.
(B) The transforming may end up with using many tables or a large table with many null columns.
(C) The ordering information may get lost.
(D) All of the above.

1.15

(A) an imperative programming language.
(B) a functional programming language.
(C) an object-oriented programming language.
(D) a service-oriented programming language.

1.16

(A) Oracle 11g and IBM DB 9.5
(B) dbXML
(C) eXist
(D) All of the above

1.17

(A) Pure XML documents
(B) Plain tables
(C) Images files
(D) All of the above

1.18

(A) an imperative programming language.
(B) a database query language.
(C) a pointer-based programming language with flexible data types.
(D) a programming language designed for scientific computing.

1.19

(A) imperative programming language.
(B) object-oriented programming languages.
(C) service-oriented programming languages.
(D) declarative programming languages.

1.20

(A) It is a lambda expression defined function.
(B) It is equivalent to a delegate expression in C#.
(C) It is executable as a C# statement.
(D) All of the above.

1.21

(A) URI.
(B) tree structure.
(C) graph structure.
(D) All of the above.

1.22

(A) GraphQL specific service.
(B) RESTful service.
(C) WSDL service.
(D) VIPLE service.

Name: _____

Date: _____

11.6 Exercises and Projects

1. Multiple choice questions. Choose one answer in each question only. Choose the best answer if multiple answers are acceptable.

1.1

(A) Data in SQL databases
(B) Data in XML databases
(C) Unstructured data like videos and audios
(D) All of the above

1.2

(A) data from different sources and of different types.
(B) what data should be stored and what data should be discarded.
(C) noise elimination and fault tolerance.

(D) extraordinary large volume of data.

1.3

(A) key-value data store
(B) generic list of objects
(C) relational data store
(D) XML data store

1.4

(A) Consistency and data integrity
(B) Availability and reliability
(C) Partition and distribution
(D) All of the above

1.5

(A) N sub-lists, and then Reduce phase computes the N sub-lists into a single list.
(B) a shorter list, and then Reduce phase computes the shorter list into a single pair as output.
(C) two half lists, and then Reduce merge the two half lists into a single list.
(D) two half lists, and then Reduce process the two half lists to obtain a single pair as output.

1.6

(A) consisting of distributed processing units and distributed storage units.
(B) that supports MapReduce computing model.
(C) that applies the same operations to multiple data sets automatically.
(D) All of the above.

1.7

(A) Data Node and Task Tracker
(B) Name Node and Task Tracker
(C) Task Tracker and Job Tracker
(D) Name Node and Job Tracker

1.8

(A) eliminating the need of writing code of mapping.
(B) eliminating the need of writing code of reducing.
(C) generating executable from visual workflow.
(D) automatically partitioning the data and generating the required number of task trackers.

1.9

(A) implements Hadoop standard.
(B) does not have a single point of failure.
(C) supports multithreading, instead of MapReduce.
(D) is a proprietary system, instead of an open-source system.

1.10

(A) the four corners of a rectangle predefined.
(B) calculated dynamically using the data collected.
(C) those that have an equal distance all its neighboring points.

(D) randomly selected.

1.11

(A) It initiates a new thread through a custom activity.
(B) It initiates a new thread through a custom event.
(C) It initiates a new thread through a code activity.
(D) It initiates a new thread through a loop.

1.12

(A) It is identical to SOA software, and there is no difference.
(B) SaaS does not use SOA technology at all.
(C) SaaS extends SOA software, and it is hosted on a cloud environment.
(D) SaaS is the same as a web service.

1.13

(A) Through a load balancer.
(B) Through a fail-over service.
(C) Through multithreading.
(D) Through software as a service.

1.14

(A) scale up.
(B) scale out.
(C) They are equally good.
(D) They are equally bad.

1.15

(A) Programming environment.
(B) Operating system.
(C) Both (A) and (B)
(D) Neither (A) nor (B).

1.16

(A) Email
(B) Operating system.
(C) Programming language Environment
(D) Memory and Processor.

1.17

(A) It is a house that is for rent by tenants.
(B) Each tenant will have specific source code within a multitenancy SaaS customized for specific applications.
(C) Each tenant can contribute their software as a part of SaaS.
(D) Only one version of the software is used for all tenants.
(E) It is not possible to scale multitenancy architecture for large applications.

1.18

(A) GCE is a data center for efficient data storage and retrieval of structured data.
(B) GCE is a data center for efficient data storage and retrieval of semi-structured data.
(C) GCE is an application development, hosting, and data management system.
(D) GCE is Google's IaaS managing processor, memory, and networking resources.

1.19

(A) To extend the content capacity of Google File System (GFS).

(B) To store metadata, such as indices, to the contents in Google File System (GFS).

(C) To use a big data table to store all the data in one place.

(D) To take the advantage of the space locality for efficient block data retrieval.

1.20

(A) A failure of a critical component that can lead to the failure of the entire system.

(B) Repeated occurrences of transient failures in a short period of time.

(C) Automatic transferring of the functions of a failed component to other components.

(D) An event indicating the occurrence of a failure.

12.8 Exercises and Projects

1. Multiple choice questions. Choose one answer in each question only. Choose the best answer if multiple answers are acceptable.

1.1

(A) 1940s (B) 1950s (C) 1980s (D) 2000s

1.2

(A) 1940s (B) 1950s (C) 1980s (D) 2000s

1.3

(A) keyboard (B) keyboard & mouse (C) touch screen (D) microphone

1.4

(A) Human machine integration (B) Based on big data processing

(C) Based on cloud computing (D) All of the above

1.5

(A) Based on existing hardware carefully designing software.

(B) Based on existing AI software carefully designing hardware to meet the needs.

(C) Design software and hardware cooperatively to meet AI needs.

(D) Design software and hardware independently based on standard interface.

1.6

(A) takes feedback from the environment.

(B) is based polynomial efficient algorithms.

(C) is running on high performance computer (HPC).

(D) offers graphic user interface.

1.7

(A) a binary decision tree.
(B) a big table of learning objects.
(C) multiple layers that perform step-wise and parallel processing of complex objects.
(D) standard communication protocols between the instructors and learners.

1.8

(A) cannot reuse any existing algorithms and library functions.
(B) can reuse certain basic algorithms and library functions, but we must design new overall solutions.
(C) can reuse all the existing algorithms and library functions, but we need to retrain the models using new data.
(D) just need to create new solutions, but the majority of the implementations can be imported from an existing project.

1.9

(A) average value
(B) median value
(C) Both (A) and (B)
(D) Neither (A) nor (B)

1.10

(A) training data and fitting the data to a model.
(B) extracting features automatically.
(C) storing massive data.
(D) big data processing.

1.11

(A) pair: (subject, predicate)
(B) pair: (subject, object)
(C) triple: (resource, property, class)
(D) triple: (subject, predicate, object)

1.12

(A) resource, property, and statement
(B) ontology, Semantic Web, and database
(C) int, character, and string
(D) class, object, and instantiation

1.13

(A) domain
(B) range
(C) type
(D) All of the above

1.14

(A) not an ontology language.
(B) a less powerful (less expressive) ontology language than RDF.
(C) a more powerful (more expressive) ontology language than RDF.
(D) none of the above.

1.15

(A) True (B) False

1.16

(A) Prolog (B) RDF (C) RDFS (D) OWL

1.17

(A) True (B) False

1.18

(A) OWL Lite (B) OWL DL and OWL Full
(C) OWL Full (D) None of the above

1.19

(A) sameAs (B) subClassOf
(C) Both (A) and (B) (D) Neither (A) nor (B)

1.20

(A) complementOf (B) disjointWith
(C) subClassOf (D) All of the above

13.8 Exercises and Projects

1. Multiple choice questions. Choose one answer in each question only. Choose the best answer if multiple answers are acceptable.

1.1

(A) Presentation (B) Services (C) Business (D) Data

1.2

(A) Presentation (B) Services (C) Business (D) Data

1.3

(A) Presentation (B) Services (C) Business (D) Data

1.4

(A) Model (B) View (C) Controller (D) None

1.5

(A) Model (B) View (C) Controller (D) None

1.6

(A) Commands (B) Data Binding (C) Model (D) Controller

1.7

(A) Functional (B) Service-oriented (C) Event-driven (D) Logic

1.8

(A) iOS (B) macOS (C) All supported (D) Windows

1.9

(A) C# (B) XAML (C) XML (D) SQL

1.10

(A) Property Attribute (B) Property Element (C) C# Code Behind (D) Model

1.11

(A) Absolute (B) Grid (C) ScrollView (D) StackPanel

1.12

(A) True (B) False

1.13

(A) Data Binding (B) Shared Resources (C) Web Service (D) Model

1.14

(A) Robot/IoT Message Out (B) Robot/IoT Message In
(C) Robot/IoT Controller (D) Custom Event

1.15

(A) "\0" (B) "\n" (C) "\n\r" (D) "\r\n"

1.16

(A) Null-conditional (B) Async/Await (C) Lambda expression (D) Static

A.6 Exercises and Projects

Name: _____

Date: _____

1. Multiple choice questions. Choose one answer in each question only. Choose the best answer if multiple answers are acceptable.

1.1

(A) Greatest Unit Intelligence
(B) Greatest User Intelligence
(C) Greatest User Interface
(D) Graphical User Interface

1.2

(A) A service typically includes a GUI, while an application does not.
(B) An application typically includes a GUI, while a service does not.
(C) A service performs mathematical functions, while an application does not.
(D) An application performs mathematical functions, while a service does not.

1.3

(A) Using a TextBox
(B) Using a Console.ReadLine
(C) Using MessageBox.Input
(D) Using PictureBox.Enter

1.4

(A) Using a TextBox.Output
(B) Using a Console.WriteLine
(C) Using MessageBox.Show
(D) Using PictureBox.Display
(E) Using a Label

1.5

(A) Using a TextBox.Output
(B) Using a Console.WriteLine
(C) Using MessageBox.Show
(D) Using PictureBox.Display
(E) Using a Label

1.6

(A) Button (B) Label (C) TextBox (D) WebBrowser

1.7

(A) Using RichTextBox
(B) Using TextBox
(C) Using Label
(D) Using GroupBox

1.8

(A) a method in an object.
(B) an object wrapped with standard interface.
(C) a list of addresses where developers can find the methods they want.
(D) an application with GUI.

1.9

(A) Private method
(B) Protected method
(C) Public method
(D) Web method

1.10

(A) find services available online.
(B) use a tool to develop services online.
(C) repair software.
(D) repair service.

Name: _____

Date: _____

B.4 Exercises and Projects

1. Multiple choice questions. Choose one answer in each question only. Choose the best answer if multiple answers are acceptable.

1.1

(A) an assembly programming language.
(B) a procedural programming language.
(C) an object-oriented programming language.
(D) a workflow-based composition language.

1.2

(A) Join waits for all inputs, while Merge waits for one input only.
(B) Join waits for all inputs, while Merge adds input values together.
(C) Join waits for one input, while Merge wait for all inputs.
(D) Join adds all input values together, while Merge wait for one input only.

1.3

(A) 1 (B) 3 (C) 5 (D) More than 5

1.4

(A) A basic activity.
(B) An activity.
(C) An activity wrapped with service interface.
(D) All of the above.

1.5

(A) To replace the value output of a string type.
(B) To replace the value output of a Boolean type.
(C) To provide an event output in addition to a value output.
(D) To provide a second value output.

1.6

(A) Print Line.
(B) Simple Dialog.
(C) Text to Speech.
(D) All of the above.

1.7

(A) v
(B) instance.v
(C) state.v
(D) variable.v

1.8

(A) p
(B) instance.p
(C) state.p
(D) parameter.p

1.9

(A) Use a build-in basic activity ConvenrtToInt32
(B) Use a build-in service ConvenrtToInt32
(C) Use Convert.ToInt32 in Calculate basic activity
(D) Use Convert to Service

1.10

(A) Right-click the activity and choose Convert to Service
(B) Right-click the activity and choose Export to Service
(C) Drag and drop the Service into the diagram and implement the service like an activity.
(D) From the menu choose Services and implement the service like an activity.