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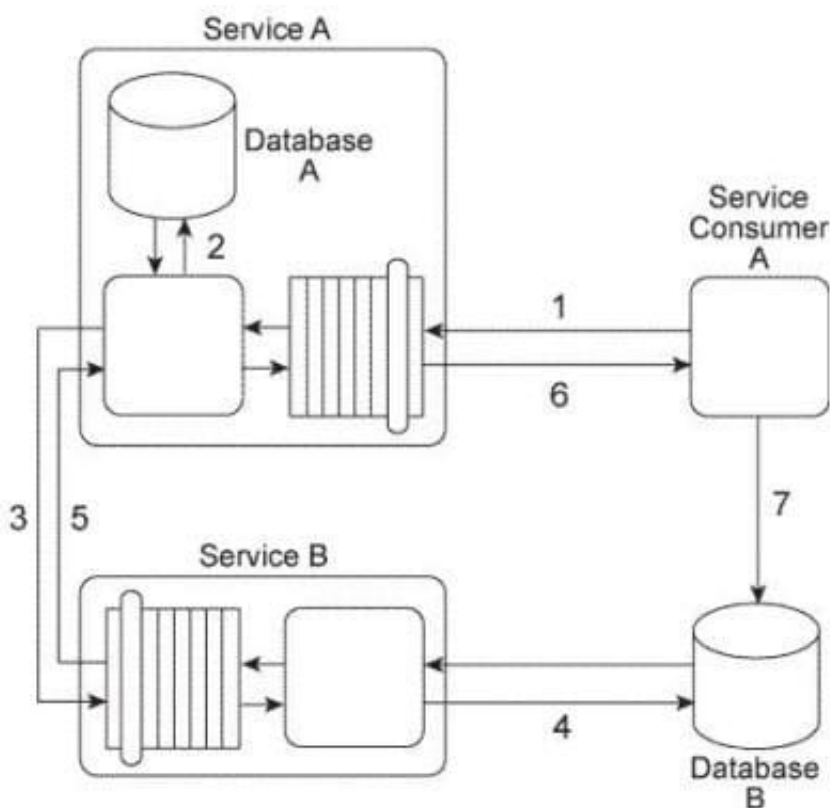


QUESTION 1

Service Consumer A sends a message with a business document to Service A (1), which writes the business document to Database A (2). Service A then forwards the business document to Service B (3), which writes the business document to Database B (4).

Service B then responds to Service A with a message containing a failure or success code (5) after which Service A responds to Service Consumer A with a message containing a failure or success code (6). Upon receiving the message, Service Consumer A updates a log table in Database B (7). The log entry is comprised of the entire business document.

Database A is dedicated to the Service A service architecture and Database B is a shared database.



There are two problems with this service composition architecture that you are asked to address: First, both Service Consumer A and Service B need to transform the business document data from an XML format to a proprietary Comma Separated Value (CSV) in order to write the data to Database B. This has led to redundant data format transformation logic that has been difficult to keep in synch when Database B changes. Secondly, Service A is an entity service that is being reused by several other service compositions. It has lately developed reliability problems that have caused the service to become unavailable for extended periods. What steps can be taken to solve these problems?

A. The Legacy Wrapper pattern can be applied so that data access to Database B is separated into a new wrapper utility service. This way, the Data Format Transformation pattern only needs to be applied within the logic of this new service which will expose a standardized contract that both Service Consumer A and Service B can access. The Asynchronous Queuing pattern can be applied so that messaging queues are established between Service Consumer A and Service A and between Service A and Service B. The Service Autonomy principle can be further applied to Service A in order to establish a more isolated and reliable surrounding infrastructure.

B. The Legacy Wrapper pattern can be applied so that data access to Database B is separated into a new wrapper utility service. This way, the Data Format Transformation pattern only needs to be applied within the logic of this new service which will expose a standardized contract that both Service Consumer A and Service B can access. The Reliable Messaging pattern can be applied so that acknowledgements are passed between Service Consumer A and Service A and between Service A and Service B . The Service Composability principle can be further applied to Service A in order to optimize its service architecture for improved participation in multiple service compositions.

C. The service composition can be redesigned with the application of the Contract Centralization pattern so that instead of writing the business document to Database B, Service Consumer A sends the business document to Service B instead. This way, Service B would provide the only location where data format transformation logic for Database B needs to be carried out, which further supports the application of the Service Reusability principle. The Reliable Messaging pattern can be applied so that acknowledgements are passed between Service Consumer A and Service A and between Service A and Service B . The Service Composability principle can be further applied to Service A in order to optimize its service architecture for improved participation in multiple service compositions.

D. None of the above.

Correct Answer: A

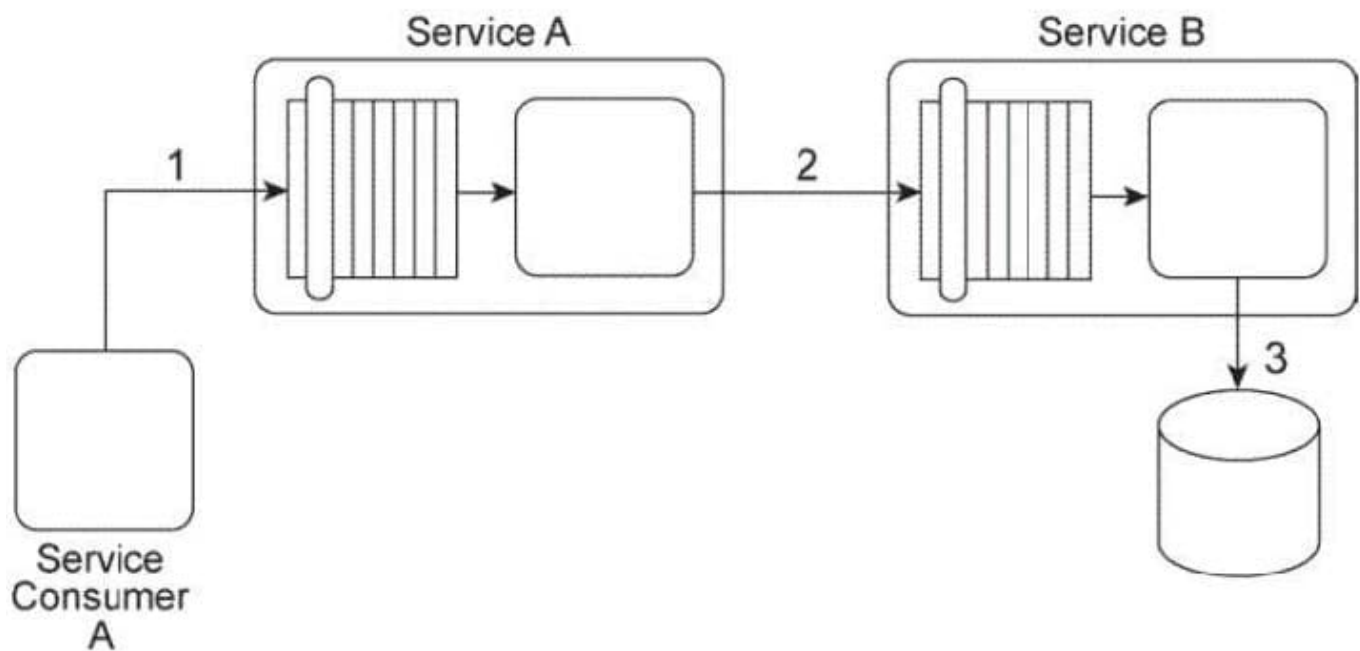
QUESTION 2

Service A is an entity service with a functional context dedicated to invoice-related processing. Service B is a utility service that provides generic data access to a database.

In this service composition architecture, Service Consumer A sends a SOAP message containing an invoice XML document to Service A(1). Service A then sends the invoice XML document to Service B (2), which then writes the invoice document to a database.

The data model used by Service Consumer A to represent the invoice document is based on XML Schema

A. The service contract of Service A is designed to accept invoice documents based on XML Schema B. The service contract for Service B is designed to accept invoice documents based on XML Schema A. The database to which Service B needs to write the invoice record only accepts entire business documents in Comma Separated Value (CSV) format.



Due to the incompatibility of the XML schemas used by the services, the sending of the invoice document from Service Consumer A through to Service B cannot be accomplished using the services as they currently exist. Assuming that the Contract Centralization pattern is being applied and that the Logic Centralization is not being applied, what steps can be taken to enable the sending of the invoice document from Service Consumer A to the database without adding logic that will increase the runtime performance requirements of the service composition?

- A. Service Consumer A can be redesigned to use XML Schema B so that the SOAP message it sends is compliant with the service contract of Service A . The Data Model Transformation pattern can then be applied to transform the SOAP message sent by Service A so that it conforms to the XML Schema A used by Service B. The Standardized Service Contract principle must then be applied to Service B and Service Consumer A so that the invoice XML document is optimized to avoid unnecessary validation.
- B. The service composition can be redesigned so that Service Consumer A sends the invoice document directly to Service B. Because Service Consumer A and Service B use XML Schema A, the need for transformation logic is avoided. This naturally applies the Service Loose Coupling principle because Service Consumer A is not required to send the invoice document in a format that is compliant with the database used by Service B.
- C. Service Consumer A can be redesigned to write the invoice document directly to the database. This reduces performance requirements by avoiding the involvement of Service A and Service B . It further supports the application of the Service Abstraction principle by ensuring that Service Consumer A hides the details of the data access logic required to write to the database.
- D. None of the above.

Correct Answer: B

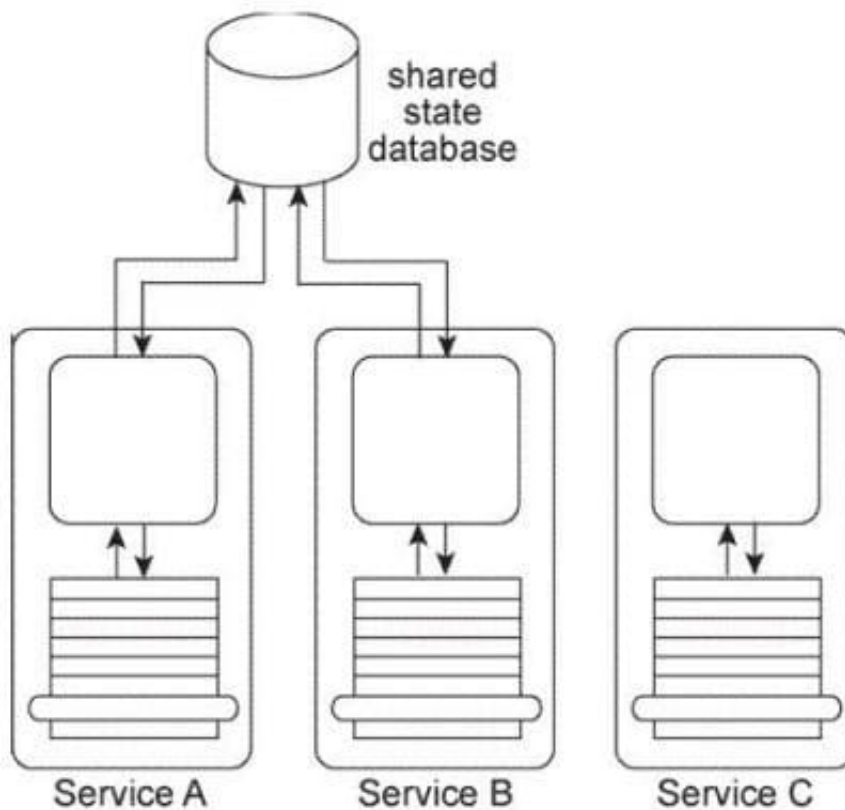
QUESTION 3

Services A, B, and C are non-agnostic task services. Service A and Service B use the same shared state database to defer their state data at runtime.

An assessment of these three services reveals that each contains some agnostic logic, but because it is bundled

together with the non-agnostic logic, the agnostic logic cannot be made available for reuse.

The assessment also determines that because Service A and Service B and the shared state database are each located in physically separate environments, the remote communication required for Service A and Service B to interact with the shared state database is causing an unreasonable decrease in runtime performance.



You are asked to redesign this architecture in order to increase the opportunity for agnostic service logic to be reused and in order to decrease the runtime processing demands so that performance can be improved. What steps can be taken to achieve these goals?

A. The Enterprise Service Bus pattern can be applied to establish an environment whereby the Process Abstraction and Process Centralization patterns are naturally applied, resulting in a clean separation of non-agnostic task services from newly designed agnostic services that are further shaped into reusable services by the application of the Service Reusability principle.

B. The Process Centralization pattern can be applied, resulting in a redesign effort where agnostic logic is removed from the three task services so that they only encapsulate non- agnostic logic. The agnostic logic is then moved to one or more new agnostic services that are shaped into reusable services by the application of the Service Reusability principle. The Process Abstraction pattern is then applied to the redesigned task services Service A and Service B, so that their logic is physically centralized, turning them into orchestrated task services.

C. The Process Abstraction pattern can be applied, resulting in a redesign effort where agnostic logic is removed from the three task services so that they only encapsulate non- agnostic logic. The agnostic logic is then moved to one or more new agnostic services that are shaped into reusable services by the application of the Service Reusability principle. The Orchestration pattern can be further applied to establish an environment whereby the Process Centralization pattern is naturally applied to Services A and B and the State Repository pattern is naturally applied to further help avoid remote communication by providing a local and centralized state database that can be shared by both services.

D. None of the above.

Correct Answer: C

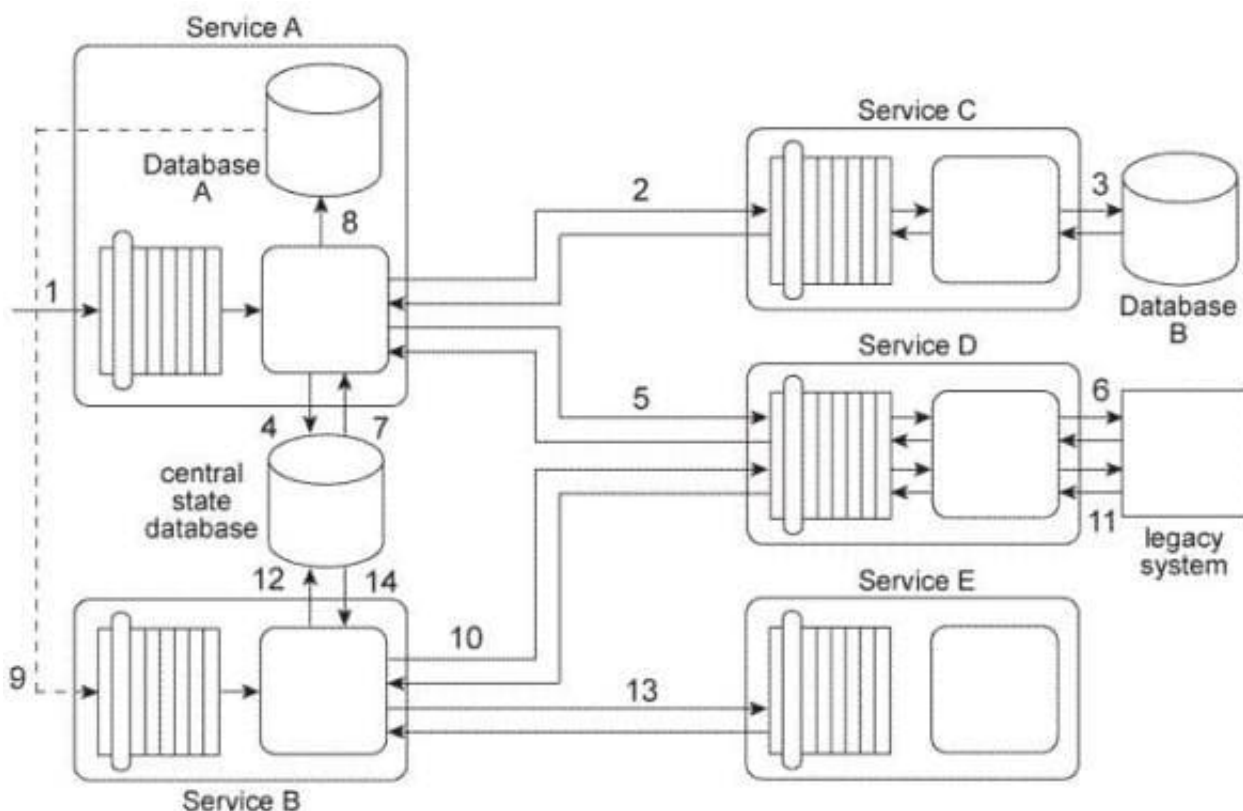
QUESTION 4

Service A is an orchestrated task service that is invoked by a separate composition initiator (1) and then sends a request message to Service C (2). Service C queries Database B to retrieve a large data record

(3) and provides this data in a response message that is sent back to Service A. Service A temporarily stores this data in a central state database (4) and then sends a request message to Service D (5), which accesses a legacy system API to retrieve a data value (6). Service D then sends this data value in a response message back to Service A. The data in the state database is subsequently retrieved by Service A (7) and merged with the newly received data value. This combined data is written to Database A (8), which triggers an event that results in the invocation of Service B (9).

Service B is an orchestrated task service that sends a request message to Service D (10), which accesses a legacy system API to retrieve a data value (11) and then sends this data value in a response message back to Service B. Service B temporarily stores this data in a central state database (12) and then sends a request message to Service E (13), which performs a runtime calculation and then responds with the calculated data value back to Service B. The data in the state database is then retrieved by Service B (14) and merged with the calculated data value. Service B then uses the merged data to complete its business task.

The following specific problems and requirements exist:



Upon reviewing these requirements it becomes evident to you that the Enterprise Service Bus compound

pattern will need to be applied. However, there are additional requirements that need to be fulfilled. To build this service composition architecture, which patterns that is not associated with the Enterprise Service Bus compound pattern need to also be applied? (Be sure to choose only those patterns that relate directly to the requirements described above. Patterns associated with the Enterprise Service Bus compound pattern include both the required or core patterns that

are part of the basic compound pattern and the optional patterns that can extend the basic compound pattern.)

- A. Atomic Service Transaction
- B. Compensating Service Transaction
- C. Data Format Transformation
- D. Data Model Transformation
- E. Event-Driven Messaging
- F. Intermediate Routing
- G. Policy Centralization
- H. Process Centralization
- I. Protocol Bridging
- J. Redundant Implementation
- K. Reliable Messaging
- L. Service Data Replication
- M. State Repository

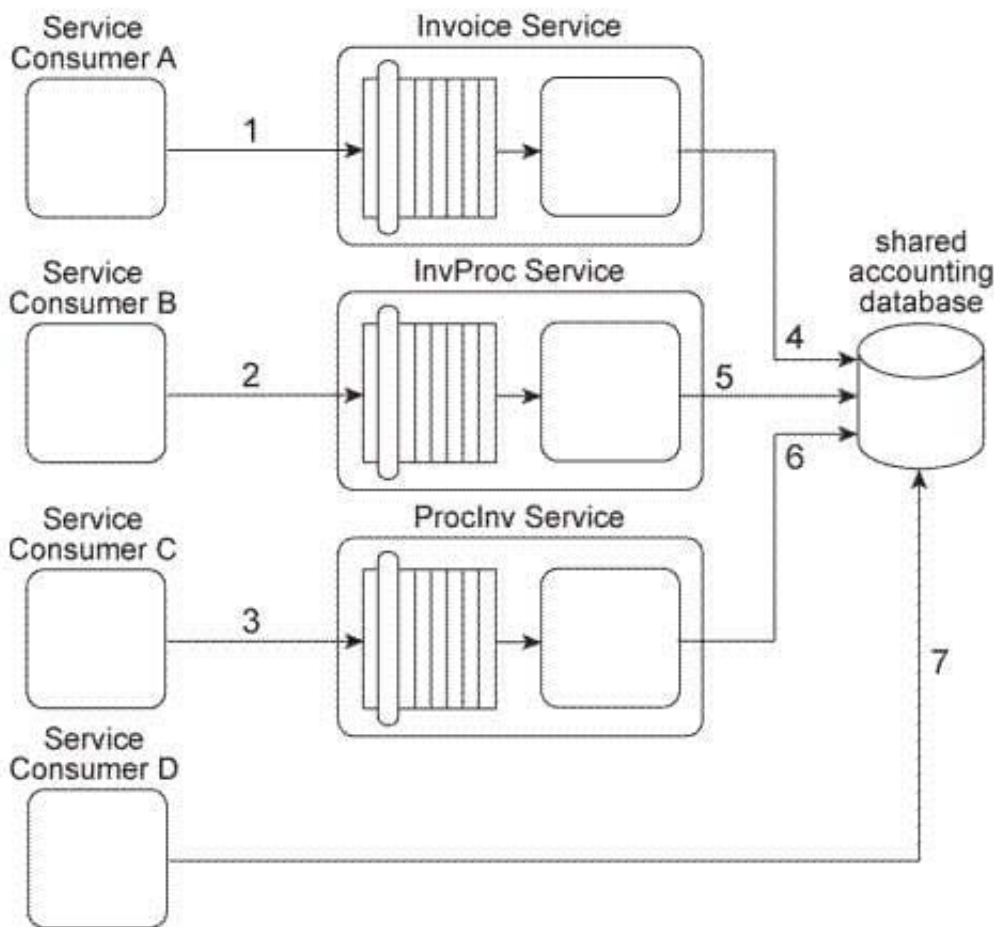
Correct Answer: HLM

QUESTION 5

Our service inventory contains the following three services that provide invoice-related data access capabilities: Invoice, InvProc, and Proclnv. These services were created at different times by different project teams and were not required to comply to any design standards. Therefore each of these services has a different data model for representing invoice data.

Currently each of these three services has one service consumer: Service Consumer A accesses the Invoice service(1). Service Consumer B (2) accesses the InvProc service, and Service Consumer C (3) accesses the Proclnv service. Each service consumer invokes a data access capability of an invoice-related service, requiring that service to interact with the shared accounting database that is used by all invoice-related services (4, 5, 6).

Additionally, Service Consumer D was designed to access invoice data from the shared accounting database directly (7). (Within the context of this architecture. Service Consumer D is labeled as a service consumer because it is accessing a resource that is related to the illustrated service architectures.)



A project team recently proclaimed that it has successfully applied the Contract Centralization pattern to the service inventory in which the Invoice service, InvProc service, and Proclnv service reside. Upon reviewing the previously described architecture you have doubts that this is true. After voicing your doubts to a manager, you are asked to provide specific evidence as to why the Contract Centralization is not currently fully applied. Which of the following statements provides this evidence?

- A. The Contract Centralization pattern is not fully applied to the Invoice, InvProc, and Proclnv services because they are being accessed by different service consumers and because they have redundant logic that introduces denormalization into the service inventory.
- B. The Contract Centralization pattern is not fully applied because Service Consumer D is accessing the shared accounting database directly.
- C. The Contract Centralization pattern is not fully applied because none of the invoice- related services are carrying out data access logic via a centralized and standardized invoice service. This is primarily because the Standardized Service Contract principle was not consistently applied during the delivery processes of the individual services.
- D. None of the above.

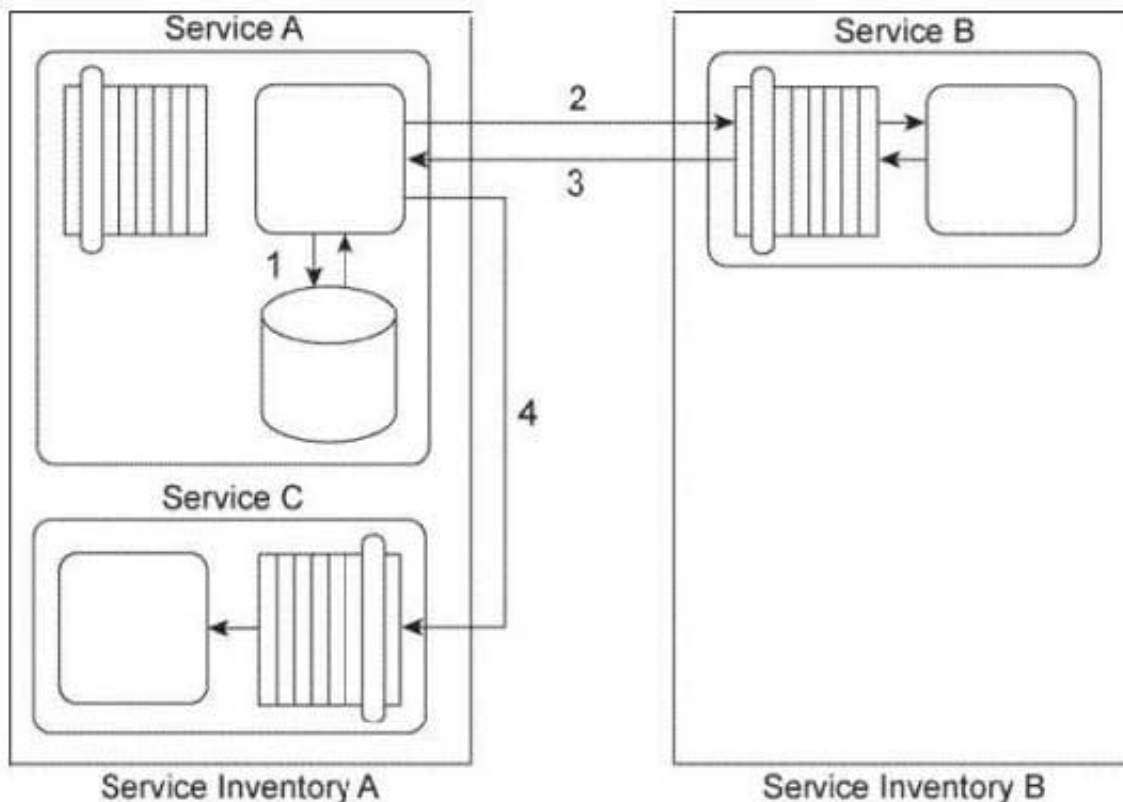
Correct Answer: B

QUESTION 6

Service A is a task service that sends Service B a message (2) requesting that Service B return data back to Service A

in a response message (3). Depending on the response received, Service A may be required to send a message to Service C (4) for which it requires no response. Before it contacts Service B, Service A must first retrieve a list of code values from its own database (1) and then place this data into its own memory. If it turns out that it must send a message to Service C, then Service A must combine the data it receives from Service B with the data from the code value list in order to create the message it sends to Service C. If Service A is not required to invoke Service C, it can complete its task by discarding the code values.

Service A and Service C reside in Service Inventory A. Service B resides in Service Inventory B.



You are told that the services in Service Inventory A are all SOAP-based Web services designed to exchange SOAP 1.1 messages and the services in Service Inventory B are SOAP-based Web services designed to exchange SOAP 1.2 messages. Therefore, Service A and Service B cannot currently communicate. Furthermore, you are told that Service B needs to access a shared database in order to retrieve the data required by Service A. The response time of the database can sometimes be lengthy, which would cause Service A to consume too much resources while it is waiting and keeping the code values in memory. How can this service composition architecture be changed to avoid these problems?

A. The Protocol Bridging pattern can be applied by establishing an intermediate processing layer between Service A and Service B that can convert SOAP 1.1 messages to SOAP 1.2 messages and vice versa. The Service Data Replication pattern can be applied to Service B so that it is given a dedicated database with its own copy of the data it needs to access. The Service Normalization pattern can then be applied to ensure that the data within the replicated database is normalized with the shared database it is receiving replicated data from.

B. The Protocol Bridging pattern can be applied by establishing an intermediate processing layer between Service A and Service B that can convert SOAP 1.1 messages to SOAP 1.2 messages and vice versa. The Service Statelessness principle can be applied with the help of the State Repository pattern so that Service A can write the code value data to a state database while it is waiting for Service B to respond.

C. The Protocol Bridging pattern can be applied by establishing an intermediate processing layer between Service A and Service B that can convert SOAP 1.1 messages to SOAP 1.2 messages and vice versa. The Intermediate Routing

pattern can be applied to dynamically determine whether Service A should send a message to Service C. The Service Autonomy principle can be applied to Service A to further increase its behavioral predictability by reducing the amount of memory it is required to consume.

D. None of the above.

Correct Answer: B

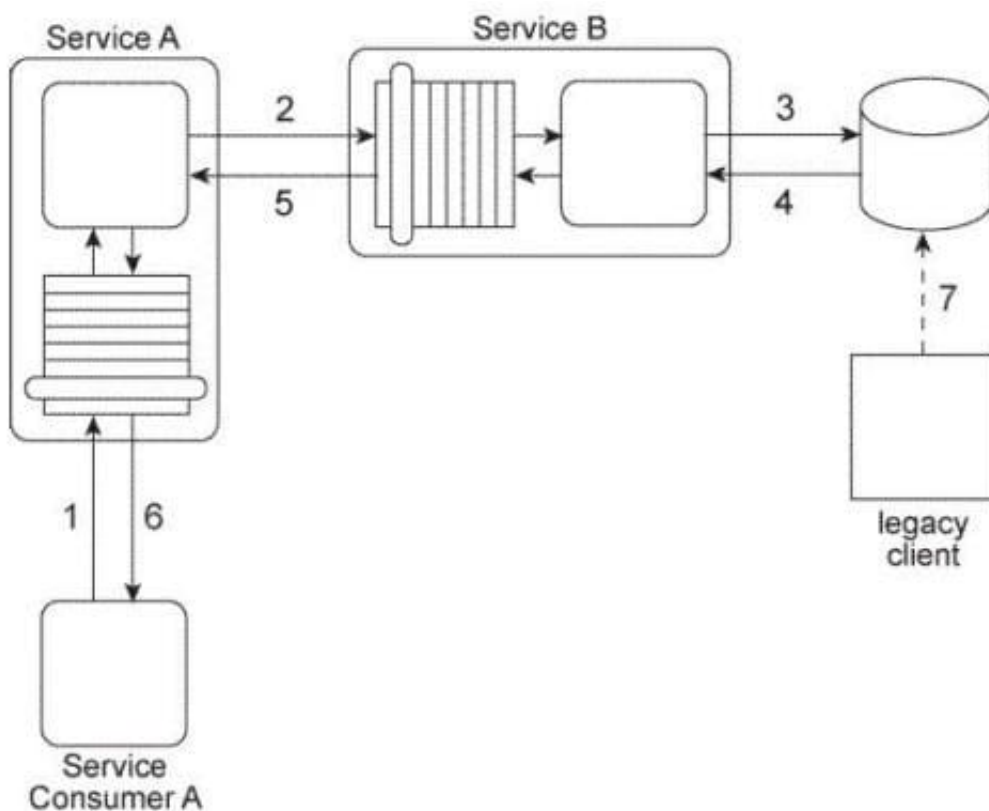
QUESTION 7

Service A is an entity service that provides a Get capability that returns a data value that is frequently changed.

Service Consumer A invokes Service A in order to request this data value (1). For Service A to carry out this request, it must invoke Service B (2), a utility service that interacts (3,4) with the database in which the data value is stored. Regardless of whether the data value changed, Service B returns the latest value to Service A (5), and Service A returns the latest value to Service Consumer A (6).

The data value is changed when the legacy client program updates the database (7) When this change happens is not predictable. Note also that Service A and Service B are not always available at the same time.

Any time the data value changes. Service Consumer A needs to receive it as soon as possible. Therefore, Service Consumer A initiates the message exchange shown in the Figure several times a day. When it receives the same data value as before, the response from Service A is ignored. When Service A provides an updated data value, Service Consumer A can process it to carry out its task.



The current service composition architecture is using up too many resources due to the repeated invocation of Service A by Service Consumer A and the resulting message exchanges that occur with each invocation. What steps can be taken to solve this problem?

A. The Event-Driven Messaging pattern can be applied by establishing a subscriber- publisher relationship between Service A and Service B . This way, every time the data value is updated, an event is triggered and Service B, acting as the publisher, can notify Service A, which acts as the subscriber. The Asynchronous Queuing pattern can be applied between Service A and Service B so that the event notification message sent out by Service B will be received by Service A, even when Service A is unavailable.

B. The Event-Driven Messaging pattern can be applied by establishing a subscriber- publisher relationship between Service Consumer A and Service A . This way, every time the data value is updated, an event is triggered and Service A, acting as the publisher, can notify Service Consumer A, which acts as the subscriber. The Asynchronous Queuing pattern can be applied between Service Consumer A and Service A so that the event notification message sent out by Service A will be

received by Service Consumer A, even when Service Consumer A is unavailable.

C. The Asynchronous Queuing pattern can be applied so that messaging queues are established between Service A and Service B and between Service Consumer A and Service A . This way, messages are never lost due to the unavailability of Service A or Service B.

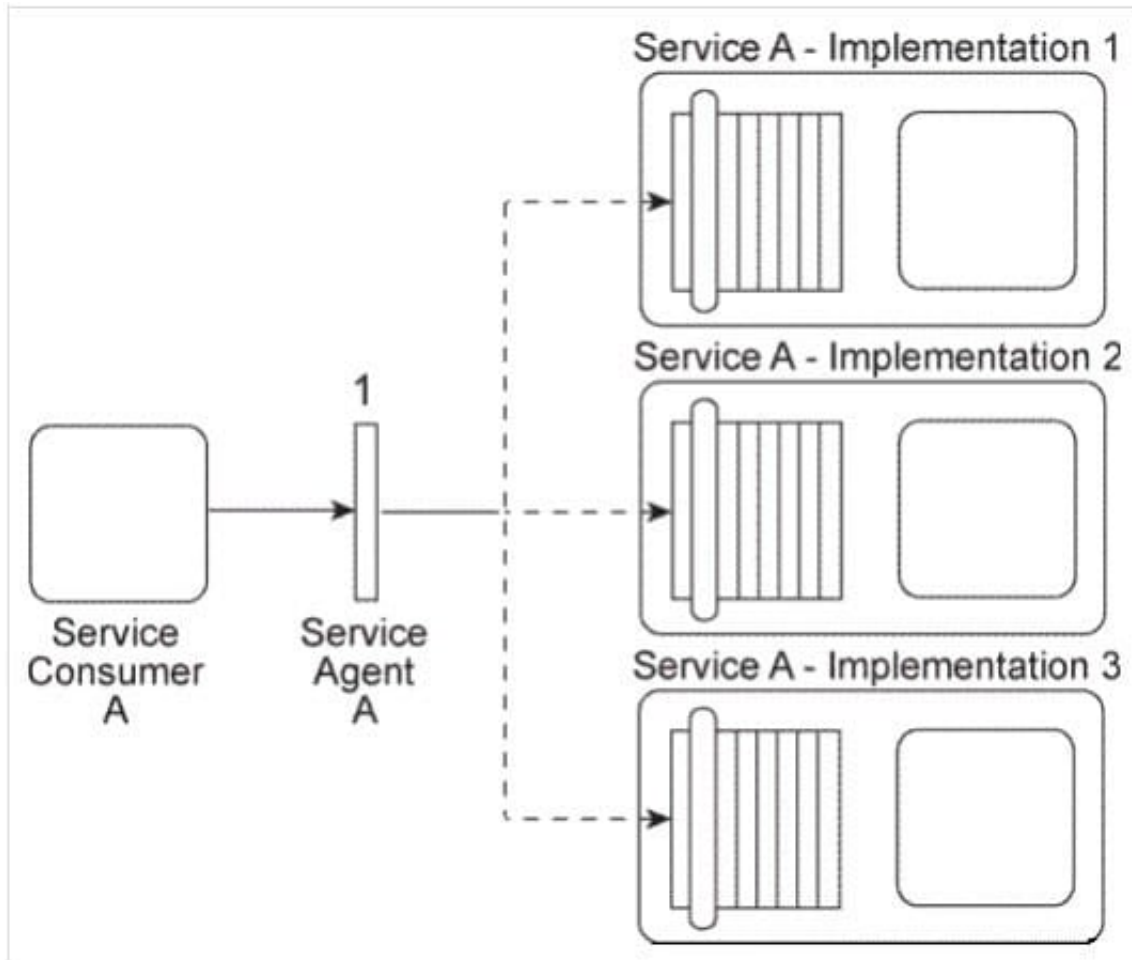
D. None of the above.

Correct Answer: D

QUESTION 8

It has been confirmed that Policy A and Policy B are, in fact, the same policy and that the security credential check performed by Service Agent B also needs to be carried out on messages sent to Service

B .



How can this service composition architecture be changed to reduce the redundancy of policy content and fulfill the new security requirement?

- A. The Policy Centralization pattern can be applied so that Policy A and Policy B are combined into the same policy. The policy enforcement logic is removed from Service Agent C and Service Agent A is then used to enforce the policy for messages sent to Service A and Service B . Service Agent B can be used to perform the security credential check for Service A and Service B .
- B. The Policy Centralization pattern can be applied so that Policy A and Policy B are combined into the same policy. The Service Agent pattern is then applied to introduce a new service agent (called Service Agent D) which carries out the validation and enforcement of Policy A and Policy B. Service Agent B can be moved so that it performs the security credential check for Service B, but not for Service A .
- C. The Policy Centralization pattern can be applied so that Service Agent A is changed to enforce the policy for messages sent to Service A and Service B and to perform the security credential check for Service A and Service B .
- D. None of the above.

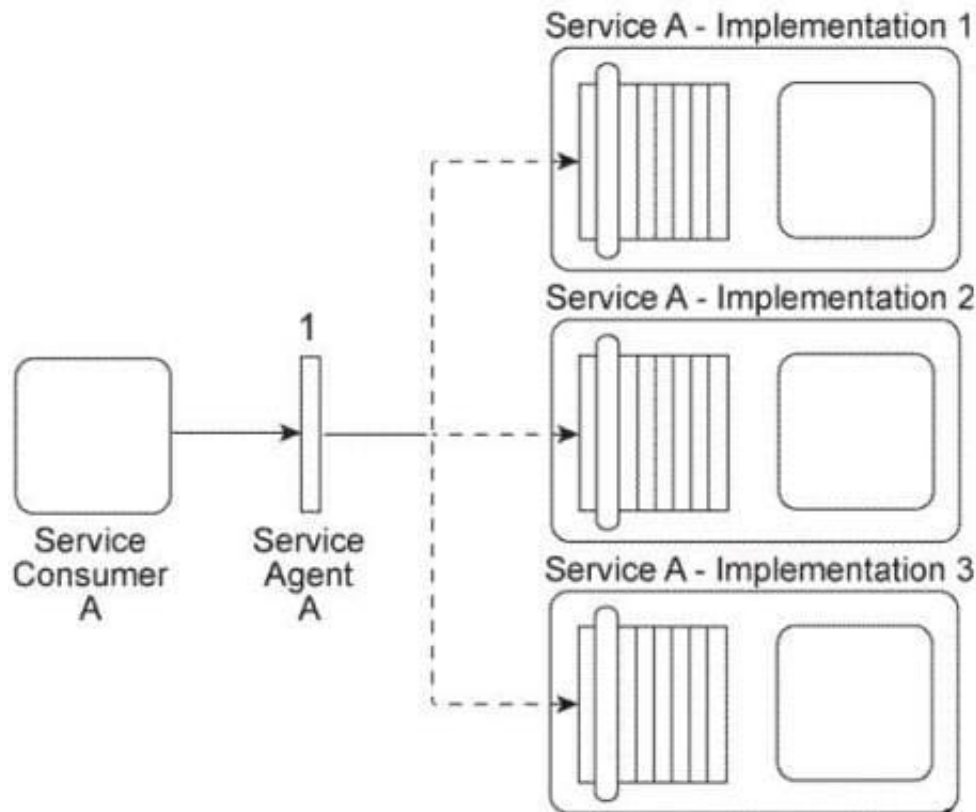
Correct Answer: A

QUESTION 9

Service Consumer A sends a message to Service A. There are currently three duplicate implementations of Service A (Implementation 1, Implementation 2, Implementation 3).

The message sent by Service Consumer A is intercepted by Service Agent A (1), which determines at runtime which implementation of Service A to forward the message to.

All three implementations of Service A reside on the same physical server.



You are told that despite the fact that duplicate implementations of Service A exist, performance is still poor at times. Also, you are informed that a new service capability will soon need to be added to Service A that will introduce functionality that will require access to a shared database that is used by many other clients and applications in the IT enterprise. This is expected to add further performance demands on Service A. How can this service architecture be changed to improve performance in preparation for the addition of the new service capability?

- A. The Standardized Service Contract principle is applied to ensure that the new service capability extends the existing service contract in a manner that is compliant with current design standards. The Redundant Implementation pattern is applied to establish separate implementations of Service A that include duplicate databases with copies of the data that Service A requires from the shared database.
- B. The Service Autonomy principle is applied to further isolate the individual implementations of Service A by separating them onto different physical servers. When the new service capability is added, the Service Data Replication pattern is applied to give each implementation of Service A its own copy of the data it requires from the shared database.
- C. The Service Loose Coupling principle is applied together with the Standardized Service Contract principle to ensure that Service Consumer A is not indirectly coupled to the shared database after the new service capability is added to the service contract. The Legacy Wrapper pattern can be applied to establish a new utility service that will provide standardized data access service capabilities for the shared database.
- D. None of the above.

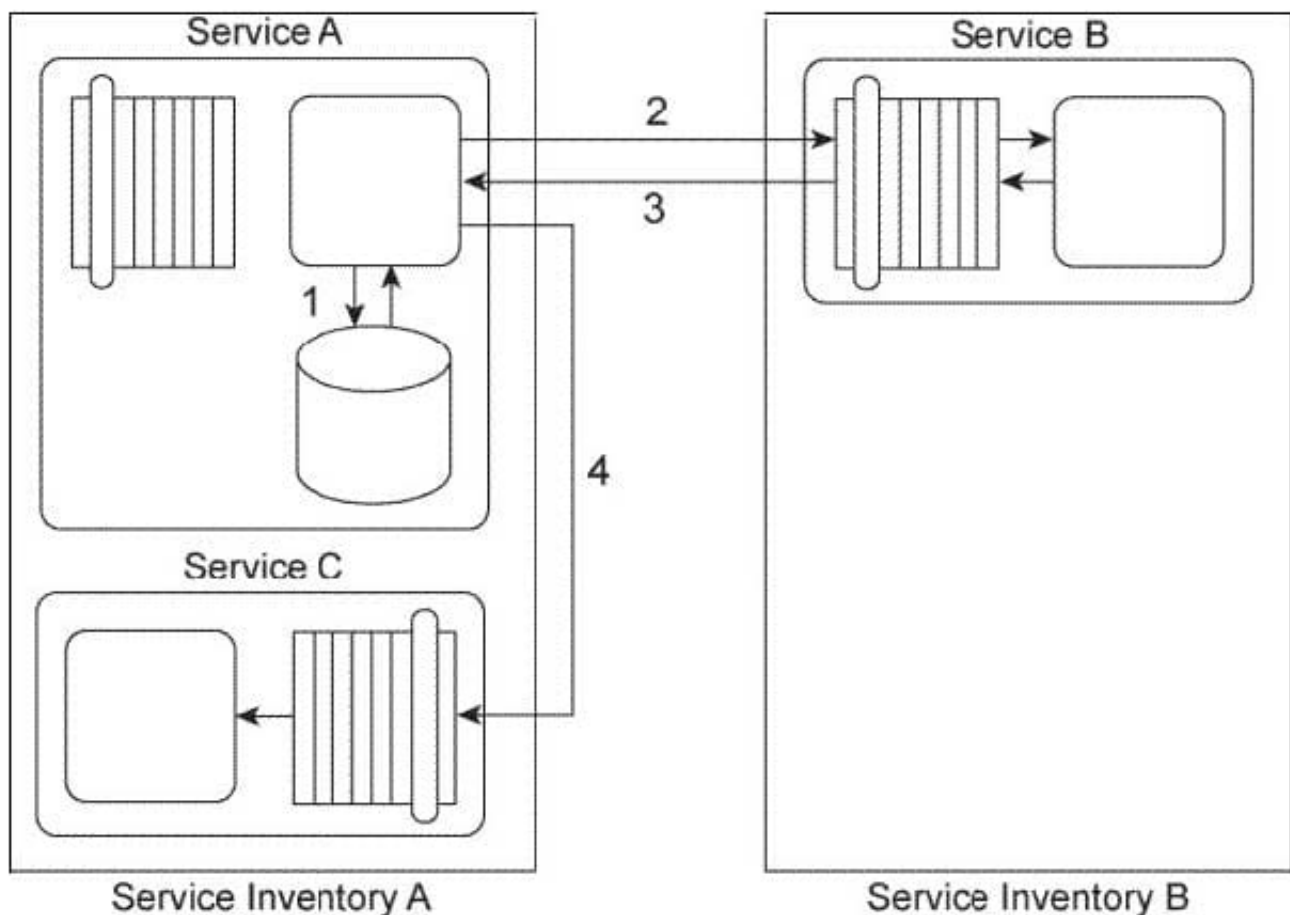
Correct Answer: B

QUESTION 10

Service A is a task service that sends Service B a message (2) requesting that Service B return data back to Service A in a response message (3). Depending on the response received. Service A may be required to send a message to Service C (4) for which it requires no response.

Before it contacts Service B, Service A must first retrieve a list of code values from its own database (1) and then place this data into its own memory. If it turns out that it must send a message to Service C, then Service A must combine the data it receives from Service B with the data from the code value list in order to create the message it sends to Service C. If Service A is not required to invoke Service C, it can complete its task by discarding the code values.

Service A and Service C reside in Service Inventory A. Service B resides in Service Inventory B.



You are told that the services in Service Inventory A were designed with service contracts based on different design standards than the services in Service Inventory B. As a result, Service A and Service B use different data models to represent the data they need to exchange. Therefore, Service A and Service B cannot currently communicate. Furthermore, Service C is an agnostic service that is heavily accessed by many concurrent service consumers. Service

C frequently reaches its usage thresholds during which it is not available and messages sent to it are not received. How can this service composition architecture be changed to avoid these problems?

A. The Data Model Transformation pattern can be applied by establishing an intermediate processing layer between Service A and Service B that can transform a message from one data model to another at runtime. The Intermediate Routing and Service Agent patterns can be applied so that when Service B sends a response message, a service agent can intercept the message and, based on its contents, either forward the message to Service A or route the message to Service C . The Service Autonomy principle can be further applied to Service C together with the Redundant Implementation pattern to help establish a more reliable and scalable service architecture.

B. The Data Model Transformation pattern can be applied by establishing an intermediate processing layer between Service A and Service B that can transform a message from one data model to another at runtime. The Asynchronous Queuing pattern can be applied to establish an intermediate queue between Service A and Service C so that when Service A needs to send a message to Service C, the queue will store the message and retransmit it to Service C until it is successfully delivered. The Service Autonomy principle can be further applied to Service C together with the Redundant Implementation pattern to help establish a more reliable and scalable service architecture.

C. The Data Model Transformation pattern can be applied by establishing an intermediate processing layer between Service A and Service B that can transform a message from one data model to another at runtime. The Intermediate Routing and Service Agent patterns can be applied so that when Service B sends a response message, a service agent can intercept the message and, based on its contents, either forward the message to Service A or route the message to Service C . The Service Statelessness principle can be applied with the help of the State Repository pattern so that Service A can write the code value data to a state database while it is waiting for Service B to respond.

D. None of the above.

Correct Answer: B

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