Advanced Monitoring Asset for IBM Integration Bus

Monitoring the business flows of IBM Integration Bus v10

Hybrid Cloud

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Introduction

- Monitoring message flows has been a concern for many customers since the origin of IBM Integration Bus (then named MQ Integrator):

  – Typical questions are:

    • What are my IIB servers and nodes doing?

    • How many message flows have been processed today?

    • Has the flow with reference "xxx" been processed? When and with which result?

- IBM Integration Bus v10 provides an infrastructure for monitoring:

  – Events can be generated by the message flows and routed to MQ topics.

- Several options based on this infrastructure exist for monitoring the flows:

  – The "Business Transaction Monitoring" functionality of IBM Integration Bus v10.

  – IBM Business Monitor.

 – Custom applications can be implemented by customers or integrators:

  The "Advanced Monitoring Asset for IBM Integration Bus" is such an application and an advanced monitoring solution which extends the capabilities of the "Business Transaction Monitoring" functionality of IIB.

Infrastructure provided by IBM Integration Bus for monitoring

- The message flows can be set to emit monitoring events as MQ messages while being executed.

- These messages are routed to MQ topics.

- The monitoring applications must subscribe to these topics in order to receive the monitoring events and then use them as needed to enable administrators to monitor the message flows.
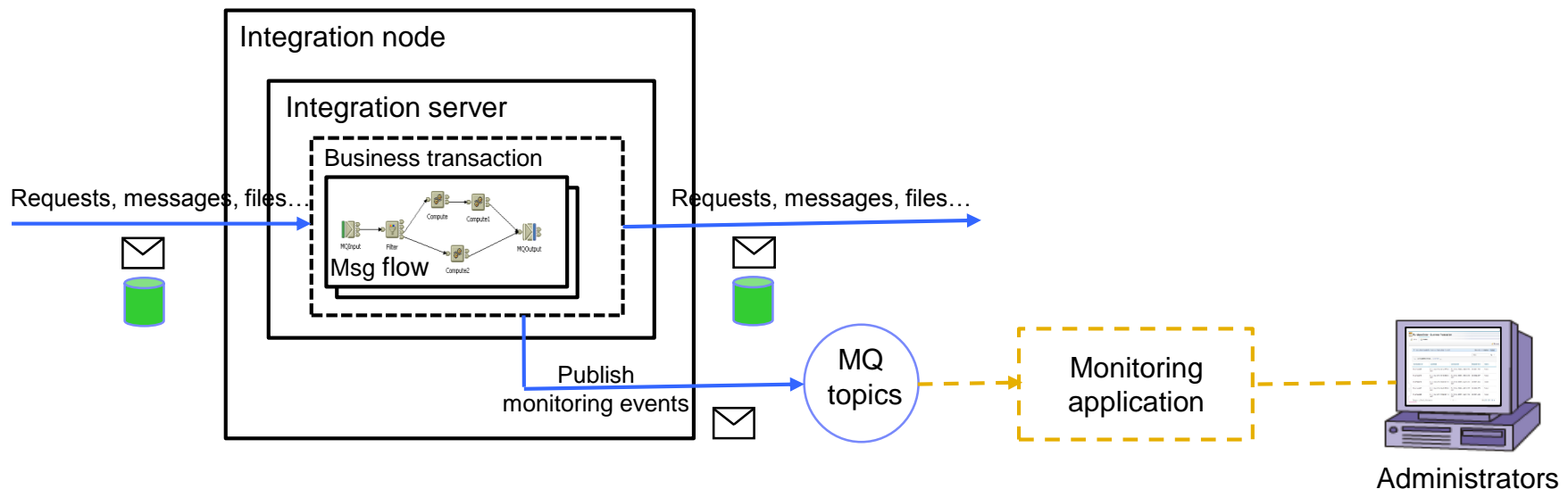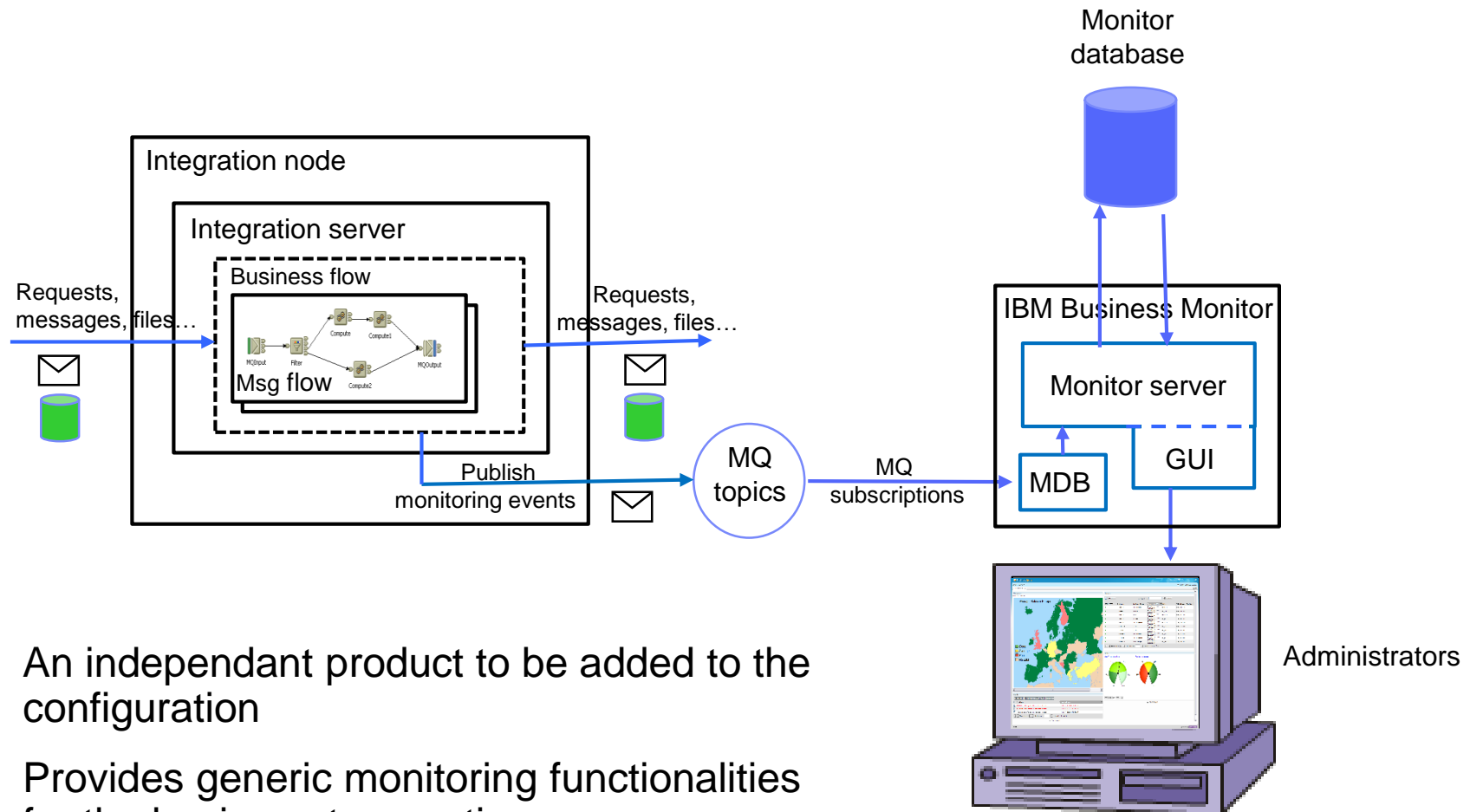
Native "Business Transaction Monitoring" of IIB v10
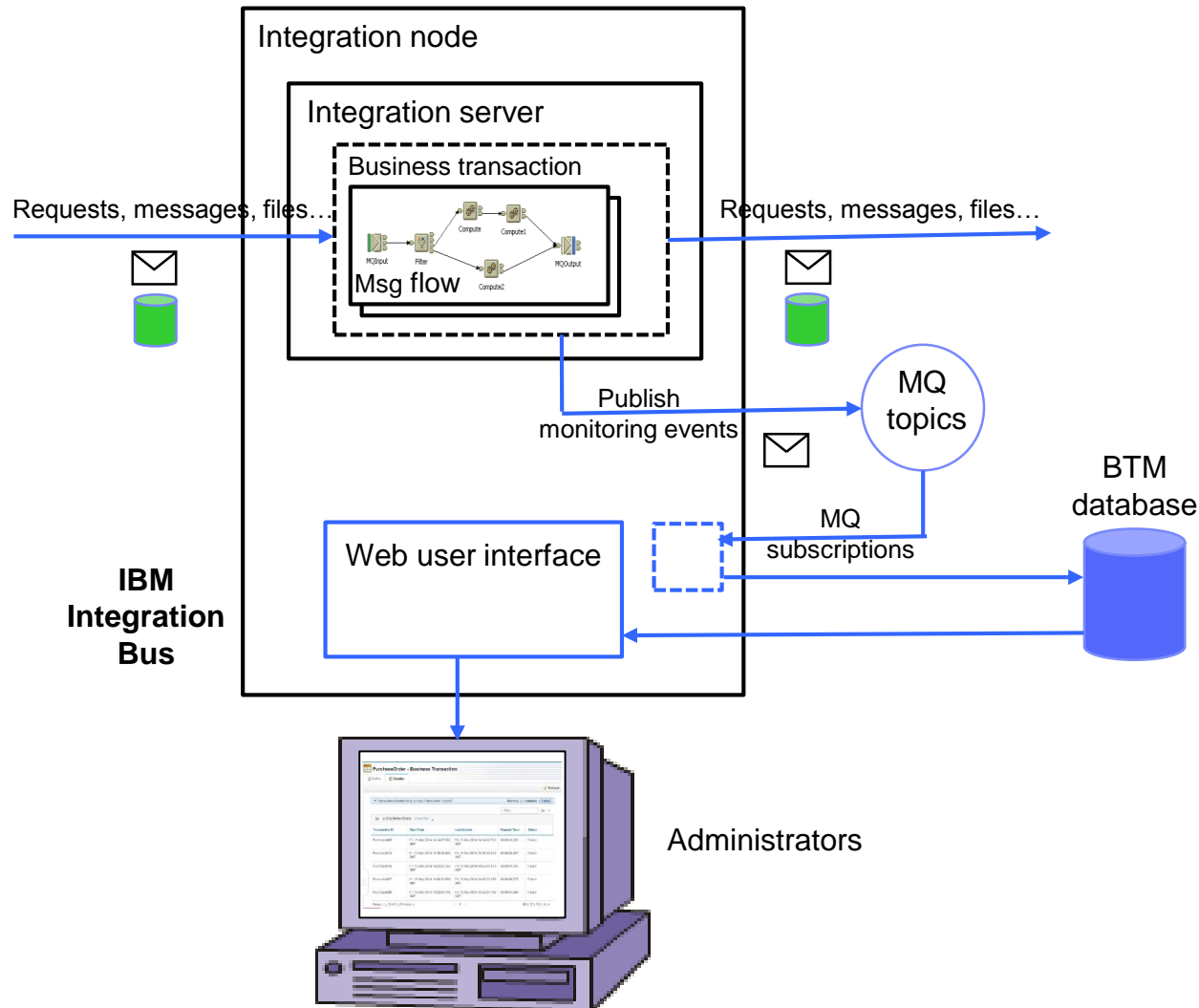
- A function included in IIB v10

- Provides basic monitoring functionalities for the business transactions

Advantages and limitations of the "Business Transaction Monitoring" functionality of IIB v10

- Advantages:
  - Provides basic monitoring functionalities for the business transactions.
  - Included in IIB and supported by the lab.

- Limitations:
  - Limited to monitoring one single integration node at a time.
  - Limited information about the flows.
  - Limited filtering:
    - Limited set of filtering criteria: not possible by dates/times, by application data…
    - No hierarchical filtering (for example: by node > by server > by message flow).
  - No statistics.

Monitoring message flows with IBM Business Monitor

Monitor database

Integration node

Integration server

Business flow

Msg flow

Requests, messages, files…

Requests, messages, files…

Publish monitoring events

MQ topics

MQ subscriptions

IBM Business Monitor

Monitor server

MDB

GUI

Administrators

- An independant product to be added to the configuration

- Provides generic monitoring functionalities for the business transactions

Advantages and limitations of using IBM Business Monitor with IIB v10

- Advantages:

  – Provides full monitoring and statistics functionalities for the business transactions.

- Limitations:

  – An independent product which needs to be purchased in addition to IIB.

  – A monitoring model needs to be created for every message flow to be monitored.

Monitoring message flows with implementing a custom application
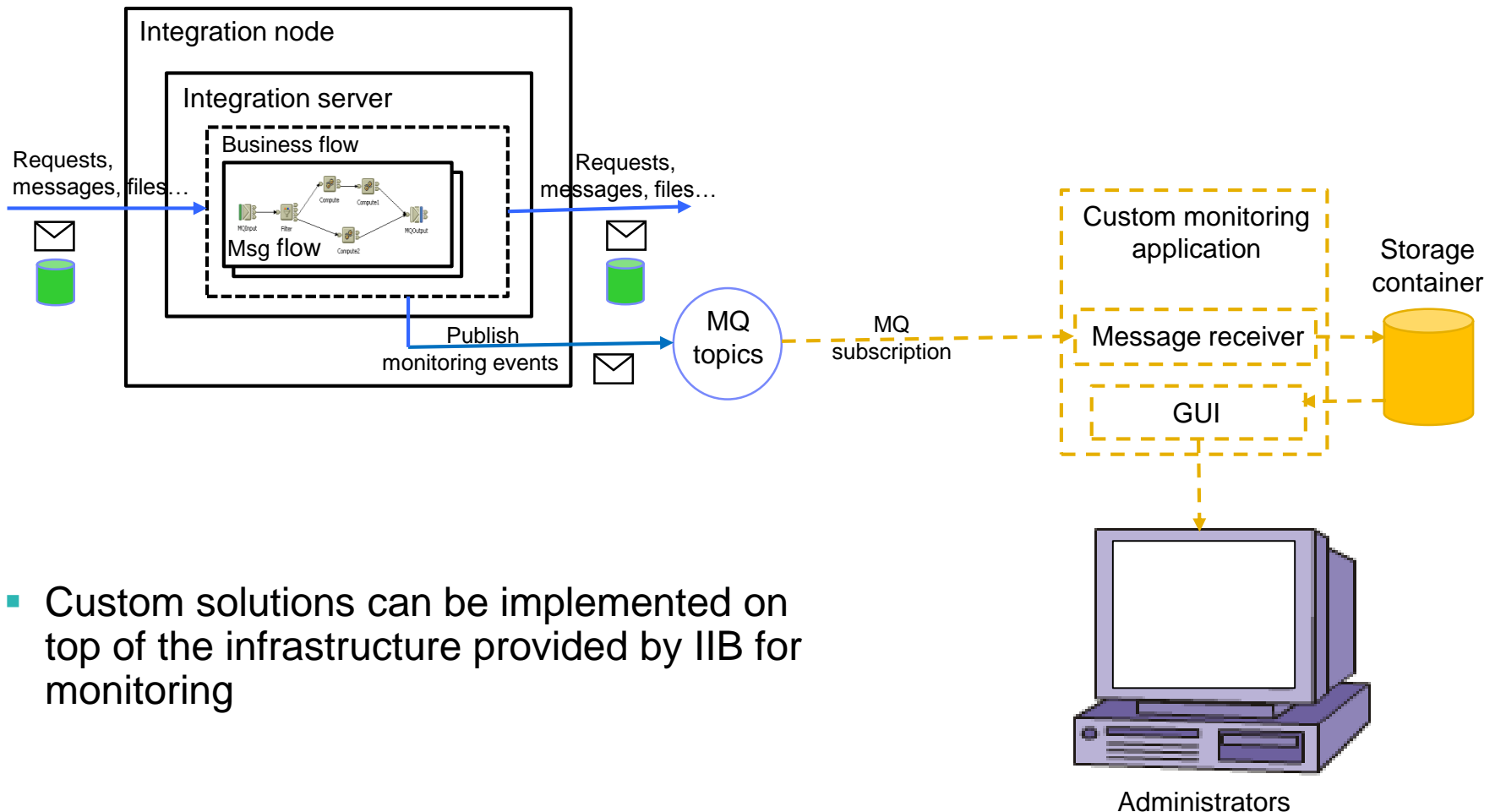
- Custom solutions can be implemented on top of the infrastructure provided by IIB for monitoring

Monitoring message flows with implementing a custom application

- It is possible to implement custom applications for monitoring the message flows or the business transactions.

- Such applications must subscribe to the MQ topics used by IBM Integration Bus in order to receive monitoring events.

- It is then up to the developers to implement the logic needed to process the events and the GUI needed for the administrators to access the monitoring information.

- The Advanced Monitoring Asset for IBM Integration Bus was implemented according to these principles.

Purposes of the Advanced Monitoring Asset for IBM Integration Bus

- The "Advanced Monitoring Asset for IBM Integration Bus" is a monitoring application implemented on top of the monitoring infrastructure provided by IBM Integration Bus.

- It extends the capabilities of the native "Business Transaction Monitoring" of IBM Integration Bus v10:

  – Displays detailed information about the business flows.

  – Provides enhanced sorting and filtering:
    - More criteria: dates/times, nodes, servers, business flows, application data…
    - Hierarchical filtering (example: by nodes > by servers > by business flow types).

  – Provides statistics about the throughputs, the processing times…

  – Enables to monitor several integration servers and integration nodes from a single GUI.

  – Removes the need for a "monitoring model" (uses an implicit one), so that new business flows can immediately be monitored as soon as they are deployed and ready to publish events.

Architecture of the Advanced Monitoring Asset for IIB
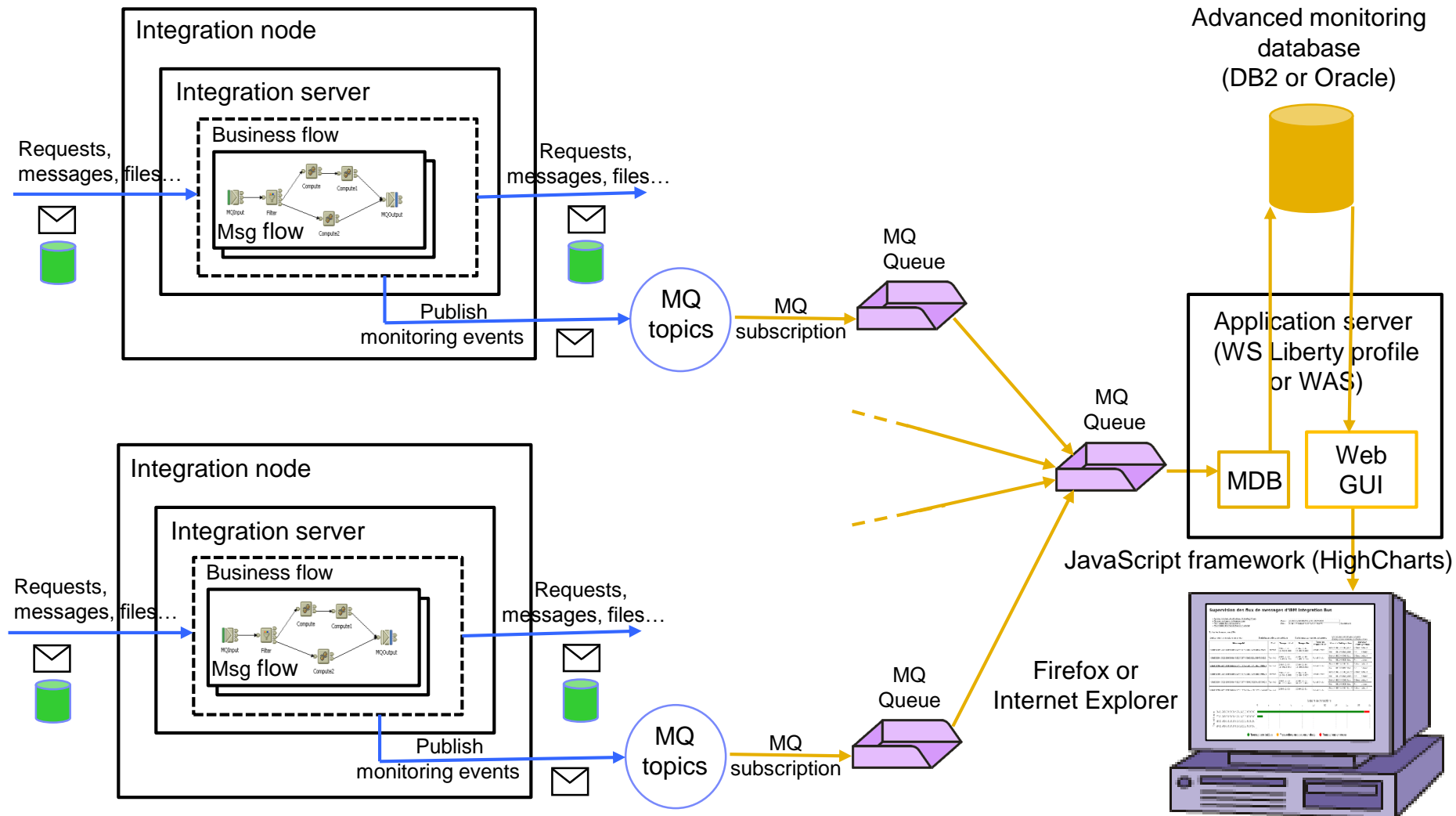
Main components of the Advanced Monitoring Asset for IIB

- **Message Driven Bean:**
  - Reads event messages from the input MQ queue.
  - Extracts the monitoring data from the event messages.
  - For each event :
    - Creates an entry in the table of events.
    - Creates or updates an entry in the table of business flows.

- **Database (DB2 or Oracle):**
  - Table of events:

  - Table of business flows:

Main components of the Advanced Monitoring Asset for IIB

- GUI:
  - Enables administrators to query the business flow and event data from the database and list them and to build statistics.
  - Business flow instances can be queried and listed with detailed information.
    - Filters can be used for the queries in order to limit the matches.
    - The events received for a business flow instance can also be queried and listed.

Id	Status	Start time	End time	Business flow type	Node / Server		Business data	
414d512049423130514d47525f537475bfefa1582176511c	Completed	2017-02-20 09:34:44.776	2017-02-20 09:34:44.776	Small Business Appli	Start: IB10NODE_Stud / default2	Id: 12345 Details/Geography/Item/City: Paris Details/Geography/Item/City: London Details/Geography/Item/City: Berlin Details/Geography/Item/City: Madrid	Value: 1 Details/Geography/Item/Country: France Details/Geography/Item/Country: UK Details/Geography/Item/Country: Germany Details/Geography/Item/Country: Spain	
					End: IB10NODE_Stud / default2			
414d512049423130514d47525f537475bfefa1582176511e	Failed	2017-02-20 09:34:44.809	2017-02-20 09:34:44.81	Small Business Appli	Start: IB10NODE_Stud / default2	Id: 12345 Details/Geography/Item/City: Paris Details/Geography/Item/City: London Details/Geography/Item/City: Berlin Details/Geography/Item/City: Madrid	Value: 0 Details/Geography/Item/Country: France Details/Geography/Item/Country: UK Details/Geography/Item/Country: Germany Details/Geography/Item/Country: Spain	
					End: IB10NODE_Stud / default2			
414d512049423130514d47525f537475bfefa15821765120	Completed	2017-02-20 09:34:44.844	2017-02-20 09:34:44.853	Retail Order	Start: IB10NODE_Stud / default	orderId: 2 customerNumber: 5555 itemNumber: 1234-6789-1212	requestType: orderItem customerName: ChocolateFan itemName: Chocolate chip cookies	
					End: IB10NODE_Stud / default			
414d512049423130514d47525f537475bfefa15821765122	Completed	2017-02-20 09:34:44.883	2017-02-20 09:34:44.888	Retail Order	Start: IB10NODE_Stud / default	orderId: 2 customerNumber: 5670 itemNumber: 3529-9999-1937	requestType: orderItem customerName: CoffeeFan itemName: ColumbianSupreme	
					End: IB10NODE_Stud / default			
414d512049423130514d47525f537475566a5a858224fd804	Completed	2017-02-20 09:34:44.918	2017-02-20 09:34:44.921	Retail Order	Start: IB10NODE_Stud2 / default	orderId: 3 customerNumber: 4785 itemNumber: 9876-5342-3847	requestType: orderItem customerName: TeaFan itemName: CeylonBlackTea	
					End: IB10NODE_Stud2 / default			
414d512049423130514d47525f537475bfefa15821765124	Completed	2017-02-20 09:34:44.95	2017-02-20 09:35:02.001	Multi Broker Transaction	Start: IB10NODE_Stud / default			
					Other: IB10NODE_Stud / default2 IB10NODE_Stud2 / default			
					End: IB10NODE_Stud2 / default2			
414d512049423130514d47525f537475bfefa15821765126	Completed	2017-02-20 09:34:44.986	2017-02-20 09:34:44.99	Retail Order	Start: IB10NODE_Stud / default	orderId: 2 customerNumber: 5555 itemNumber: 1234-6789-1212	requestType: orderItem customerName: ChocolateFan itemName: Chocolate chip cookies	
					End: IB10NODE_Stud / default			

Main components of the Advanced Monitoring Asset for IIB

- GUI:
  - Statistics can be built from the results of a query and displayed as a bar chart.
    - Various statistics about the business flow throughouts and the processing times are offered.

Main menu of the GUI

- The main menu offers different types of queries with various filters to query business flows from the database and display them as a table.

Advanced monitoring of IBM Integration Bus business flows

See all business flows	Start:	2017/02/19 00:00:00 (CET)		Business data (name, value):			Max number of business flows per page:	7	Logout
See all failed business flows	End:	2017/08/04 17:43:03 (CEST)	☑ Now						
Monitor by integration nodes/servers									
Monitor by business flow types									

Welcome in the Advanced Monitoring application for IBM Integration Bus business flows!

Please select an action in the above menu.

Home

Querying and listing business flow instances

- Business flow instances are retrieved from the database and displayed with a rich set of information:

  - Id, status, start/end dates & times, business flow type, node(s)/server(s), business data.

Advanced monitoring of IBM Integration Bus business flows

See all business flows
See all failed business flows
Monitor by integration nodes/servers
Monitor by business flow types

Start: 2017/01/19 00:00:00 (CET)
End: 2017/08/06 15:48:01 (CEST) ☑ Now

Business data (name, value):

Max number of business flows per page: 7

Logout

All business flows for the period from **January 19, 2017 12:00:00 AM CET to August 6, 2017 3:48:01 PM CEST (from 15 to 21 of 10010):**

Limit to failed flows   Order: select a sort method...   Statistics: select type and display...

Id	Status	Start time	End time	Business flow type	Node / Server		Business data	
414d512049423130514d47525f537475bfefa1582176511c	Completed	2017-02-20 09:34:44.776	2017-02-20 09:34:44.776	Small Business Appli	Start: IB10NODE_Stud / default2 End: IB10NODE_Stud / default2		Id: 12345 Details/Geography/Item/City: Paris Details/Geography/Item/City: London Details/Geography/Item/City: Berlin Details/Geography/Item/City: Madrid	Value: 1 Details/Geography/Item/Country: France Details/Geography/Item/Country: UK Details/Geography/Item/Country: Germany Details/Geography/Item/Country: Spain
414d512049423130514d47525f537475bfefa1582176511e	Failed	2017-02-20 09:34:44.809	2017-02-20 09:34:44.81	Small Business Appli	Start: IB10NODE_Stud / default2 End: IB10NODE_Stud / default2		Id: 12345 Details/Geography/Item/City: Paris Details/Geography/Item/City: London Details/Geography/Item/City: Berlin Details/Geography/Item/City: Madrid	Value: 0 Details/Geography/Item/Country: France Details/Geography/Item/Country: UK Details/Geography/Item/Country: Germany Details/Geography/Item/Country: Spain
414d512049423130514d47525f537475bfefa15821765120	Completed	2017-02-20 09:34:44.844	2017-02-20 09:34:44.853	Retail Order	Start: IB10NODE_Stud / default End: IB10NODE_Stud / default		orderId: 2 customerNumber: 5555 itemNumber: 1234-6789-1212	requestType: orderItem customerName: ChocolateFan itemName: Chocolate chip cookies
414d512049423130514d47525f537475bfefa15821765122	Completed	2017-02-20 09:34:44.883	2017-02-20 09:34:44.888	Retail Order	Start: IB10NODE_Stud / default End: IB10NODE_Stud / default		orderId: 2 customerNumber: 5670 itemNumber: 3529-9999-1937	requestType: orderItem customerName: CoffeeFan itemName: ColumbianSupreme
414d512049423130514d47525f53747566a5a858224fd804	Completed	2017-02-20 09:34:44.918	2017-02-20 09:34:44.921	Retail Order	Start: IB10NODE_Stud2 / default End: IB10NODE_Stud2 / default		orderId: 3 customerNumber: 4785 itemNumber: 9876-5342-3847	requestType: orderItem customerName: TeaFan itemName: CeylonBlackTea
414d512049423130514d47525f537475bfefa15821765124	Completed	2017-02-20 09:34:44.95	2017-02-20 09:35:02.001	Multi Broker Transaction	Start: IB10NODE_Stud / default Other: IB10NODE_Stud / default2 IB10NODE_Stud2 / default End: IB10NODE_Stud2 / default2			
414d512049423130514d47525f537475bfefa15821765126	Completed	2017-02-20 09:34:44.986	2017-02-20 09:34:44.99	Retail Order	Start: IB10NODE_Stud / default End: IB10NODE_Stud / default		orderId: 2 customerNumber: 5555 itemNumber: 1234-6789-1212	requestType: orderItem customerName: ChocolateFan itemName: Chocolate chip cookies

Go to preceding   Go to beginning   Go to line
Go to next   Go to end
Home

Filtering on dates/times and business data

- Business flow instances can be filtered by dates/times and, optionally, by business data:

- – Wildcard characters (_ and %) can be used in the business data values.

Displaying business flow instances from various nodes/servers

- Business flow instances having executed on various nodes/servers can be monitored together.

- Business flow instances may start on a node/server, continue on other node(s)/server(s) and complete on yet another node/server.

Id	Status	Start time	End time	Business flow type	Node / Server	
414d512049423130514d47525f53747509fc9c5892ec3b21	Completed	2017-02-19 16:09:54.932	2017-02-19 16:09:55.277	Retail Order	Start: IB10NODE_Stud / default End: IB10NODE_Stud / default	order custo itemN
414d512049423130514d47525f53747509fc9c5899ec3b21	Completed	2017-02-19 16:09:54.953	2017-02-19 16:09:55.154	Multi Broker Transaction	Start: IB10NODE_Stud / default Other: IB10NODE_Stud / default2 IB10NODE_Stud2 / default End: IB10NODE_Stud2 / default2	
414d512049423130514d47525f53747509fc9c589bec3b21	Completed	2017-02-19 16:09:54.962	2017-02-19 16:09:54.965	Small Business Appli	Start: IB10NODE_Stud / default2 End: IB10NODE_Stud / default2	Id: 12 Detai Detai Detai Detai

Filtering failed business flow instances

- The query can also be limited to failed flow instances:

Hierarchical filtering of the business flows:
by nodes, then by servers, then by flow types

Hierarchical filtering of the business flows:
by flow types, then by nodes, then by servers

Navigating in the list of retrieved business flows and sorting it

- Generally, only part of the list of the retrieved business flows gets displayed. Buttons enable to move forward and backward.

- The list can be sorted in various ways.

Listing the monitoring events received for a business flow instance

- The events received for a business flow instance can also be displayed below the list of business flow instances:

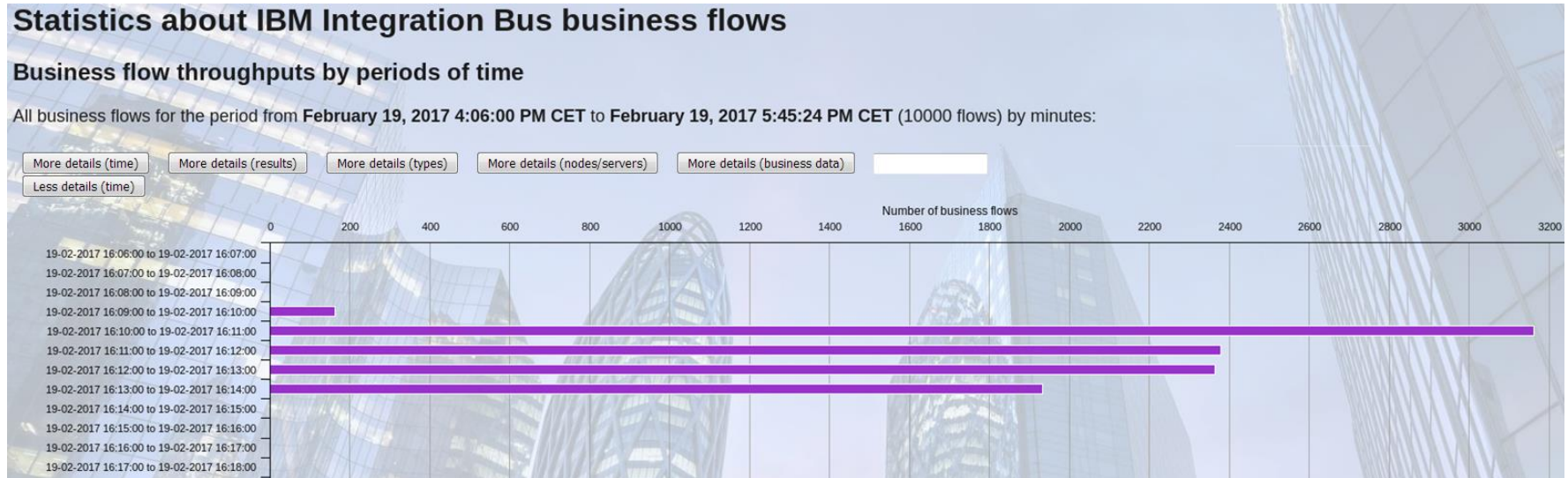# Statistics about the throughputs and processing times of the business flows

- Statitics are requested from the main panel and calculated from the results of a query (possibly filtered) executed in the main panel.

- Several types of statistics are offered about the throughputs and processing times of the business flows:

All business flows for the period from **February 9, 2017 12:00:00 AM CET** to **August 9, 2017 9:53:00 PM CEST** (from 1 to 20 of 10010):

| Limit to failed flows	Order: select a sort method... ▼	Statistics: select type and display... ▼		
Id	St		**Business flow type**	**Node / Server**
		Statistics: select type and display...		
		Statistics on throughputs by periods of time		Start: IB10NODE_Stud / default
414d512049423130514d47525f537475bfefa15821765102	Com	Statistics on throughputs by nodes/servers and flow types	4:44.337 Retail Order	
		Statistics on processing times		End: IB10NODE_Stud / default
				Start: IB10NODE_Stud / default
414d512049423130514d47525f537475bfefa15821765104	Completed 2017-02-20 09:34:44.306	2017-02-20 09:34:44.353	Retail Order	End: IB10NODE_Stud / default

Statistics about throughputs by periods of time

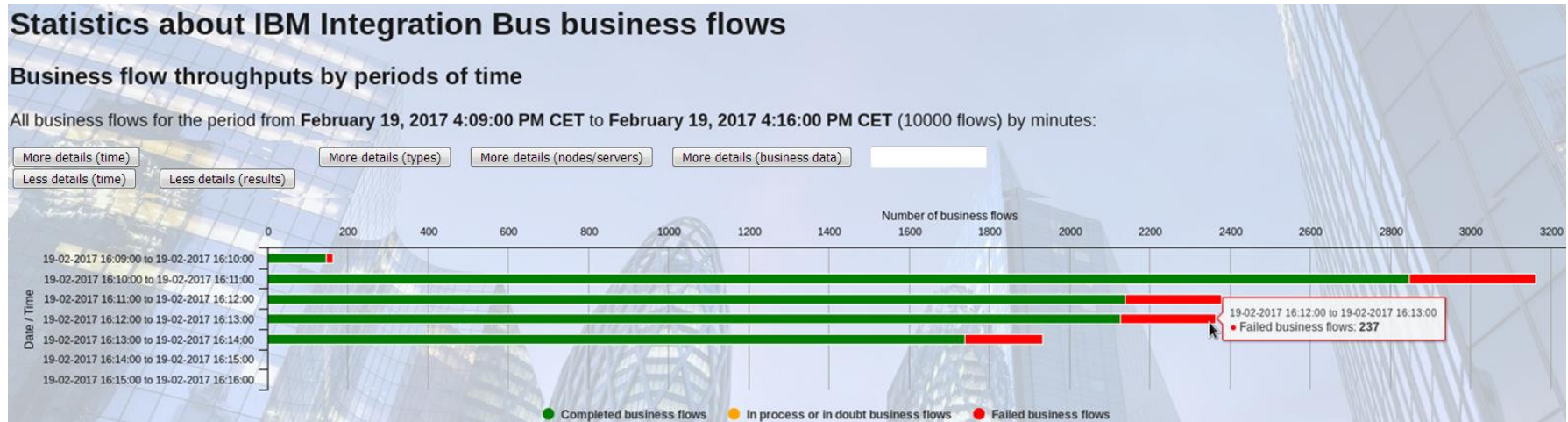- Global throughputs (number of instances per periods of time):

Statistics about throughputs by periods of time

- The periods of time can be chosen: seconds, minutes, hours, days, weeks, months or years.
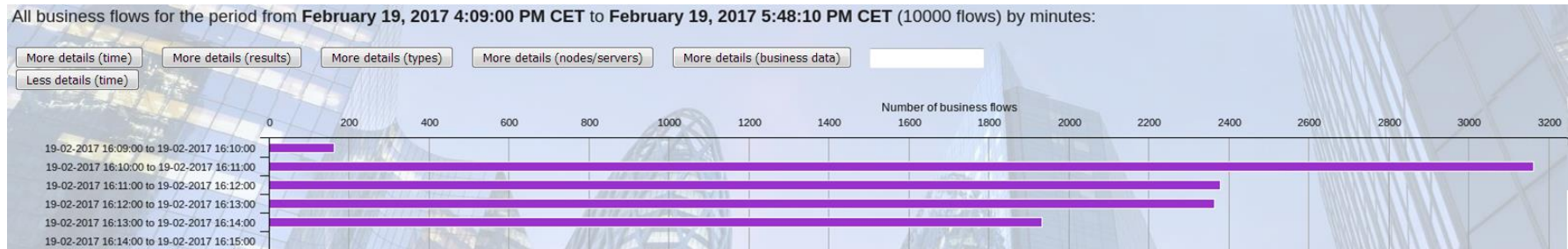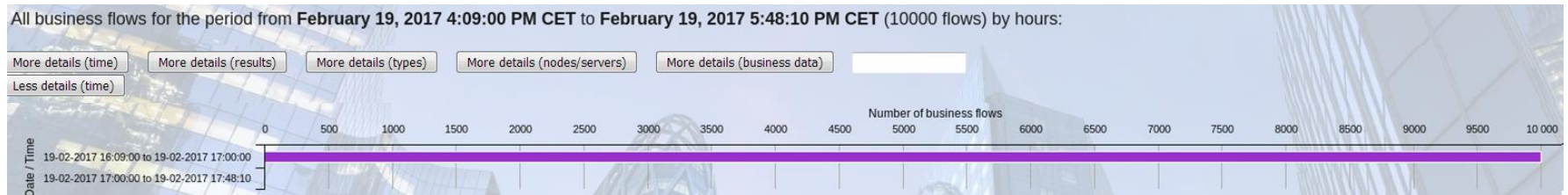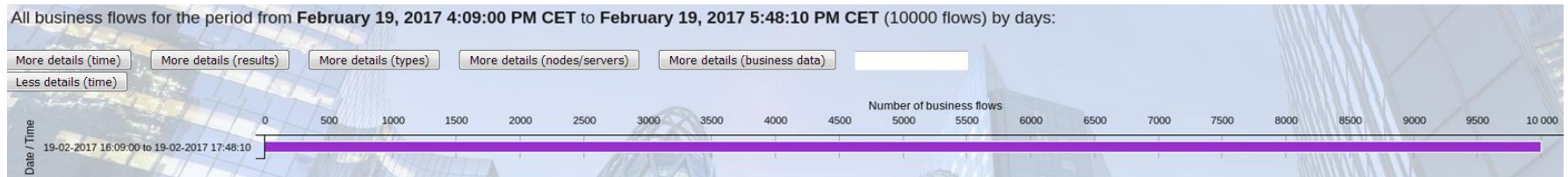
Statistics about throughputs by periods of time

- The throughputs can be split by results (completed, failed, in process/in doubt):
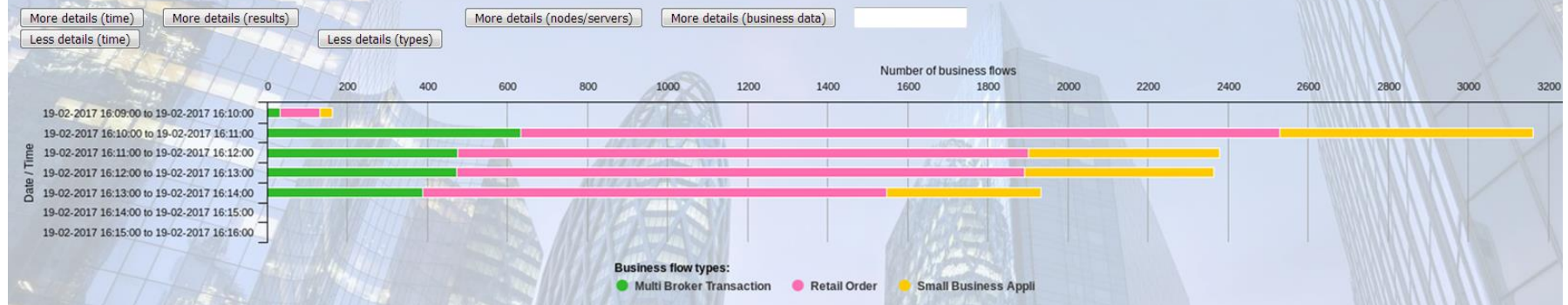
Statistics about throughputs by periods of time

- The throughputs can be split by business flow types:

Statistics about throughputs by periods of time
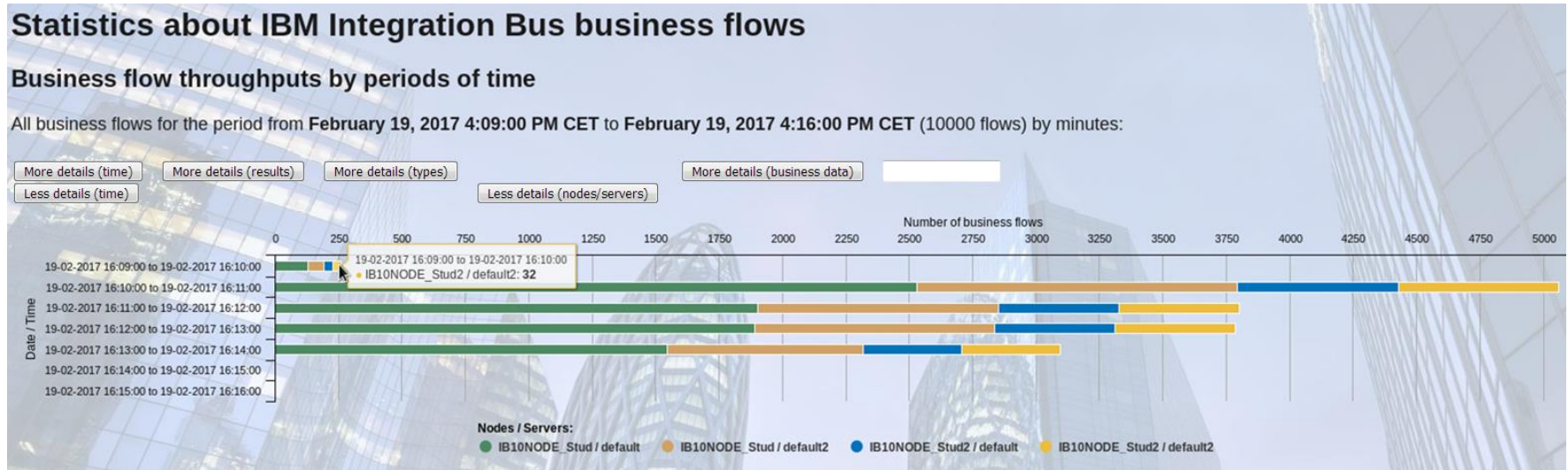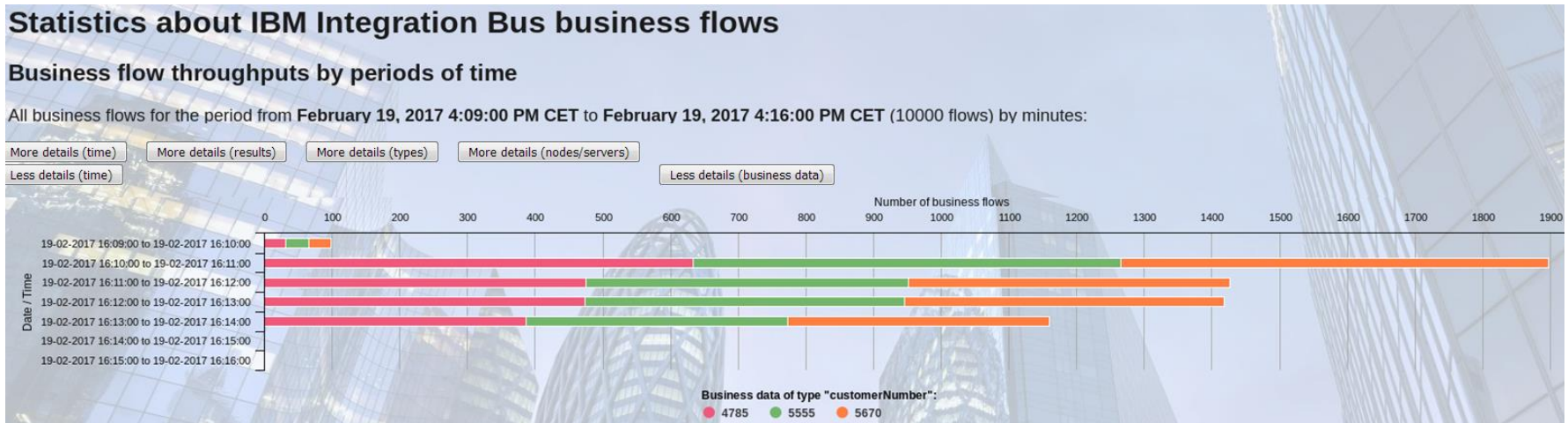
- The throughputs can be split by nodes or by nodes / servers:

Statistics about throughputs by periods of time

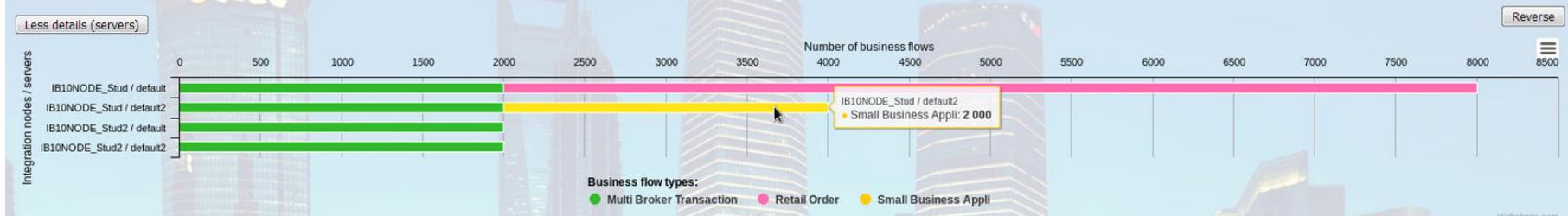- The throughputs can be split by business data values:

Statistics about throughputs by nodes/servers and by business flow types

Advanced Monitoring Asset for IBM Integration Bus

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Statistics about processing times by periods of time

- The minimum, average and maximum processing times are displayed by periods of time.

- The periods of time can be chosen: seconds, minutes, hours, days, weeks, months or years.

Additional information

- Supported environments and products:
  - Windows 64-bit or Linux 64-bit.
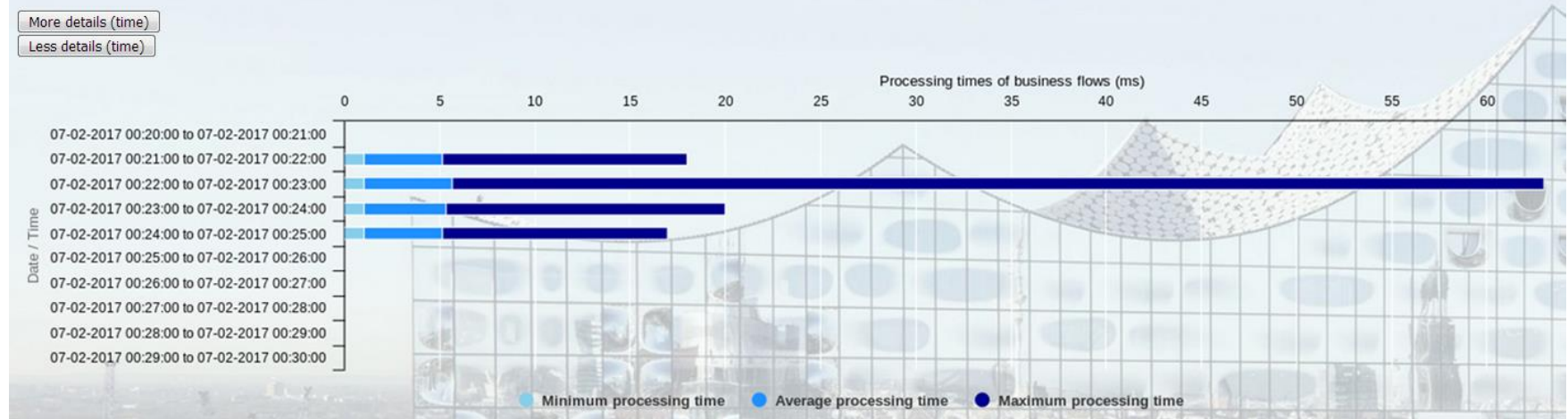 - IBM Integration Bus v10.0.
  - IBM MQ v7.1 or higher.
  - DB2 v9.0 or higher or Oracle 12c or higher
  - WebSphere Liberty Profile v8.5 or higher or WebSphere Application Server v8.5 or higher (Java 1.7 or higher).
  - HighChart JS from Highsoft (included in the asset as OEM).

- Supported languages: English, French, German and Spanish for the GUI.

- Available as an IBM Cloud Services asset (an evaluation version is available for free).

Conclusion

- The "Advanced Monitoring Asset for IBM Integration Bus" provides first class monitoring and statistics capabilities for the business flows executed by IBM Integration Bus.

- Based on:
  - The infrastructure provided by IIB for implementing custom monitoring solutions.
  - Reputable components:
    - IBM MQ,
    - IBM DB2 or Oracle Database,
    - IBM WebSphere Liberty profile or WebSphere Application Server,
    - HighCharts JavaScript framework.

- Intuitive and easy to use GUI (no training needed).

- Little to be done to enable monitoring for new flows:
  - Uses a generic implicit "monitoring model".
  - A new flow can be monitored as soon as it is deployed and ready to publish monitoring events.

धन्यवाद
Hindi

多謝
Traditional Chinese

ขอบคุณ
Thai

Спасибо
Russian

Gracias
Spanish

Thank You
English

Merci
French

شكراً
Arabic

Obrigado
Brazilian Portuguese

Grazie
Italian

多谢
Simplified Chinese

Danke
German

நன்றி
Tamil

ありがとうございました
Japanese

감사합니다
Korean

MQ architecture