

Data Generator for SAP Solutions using Benerator Tool

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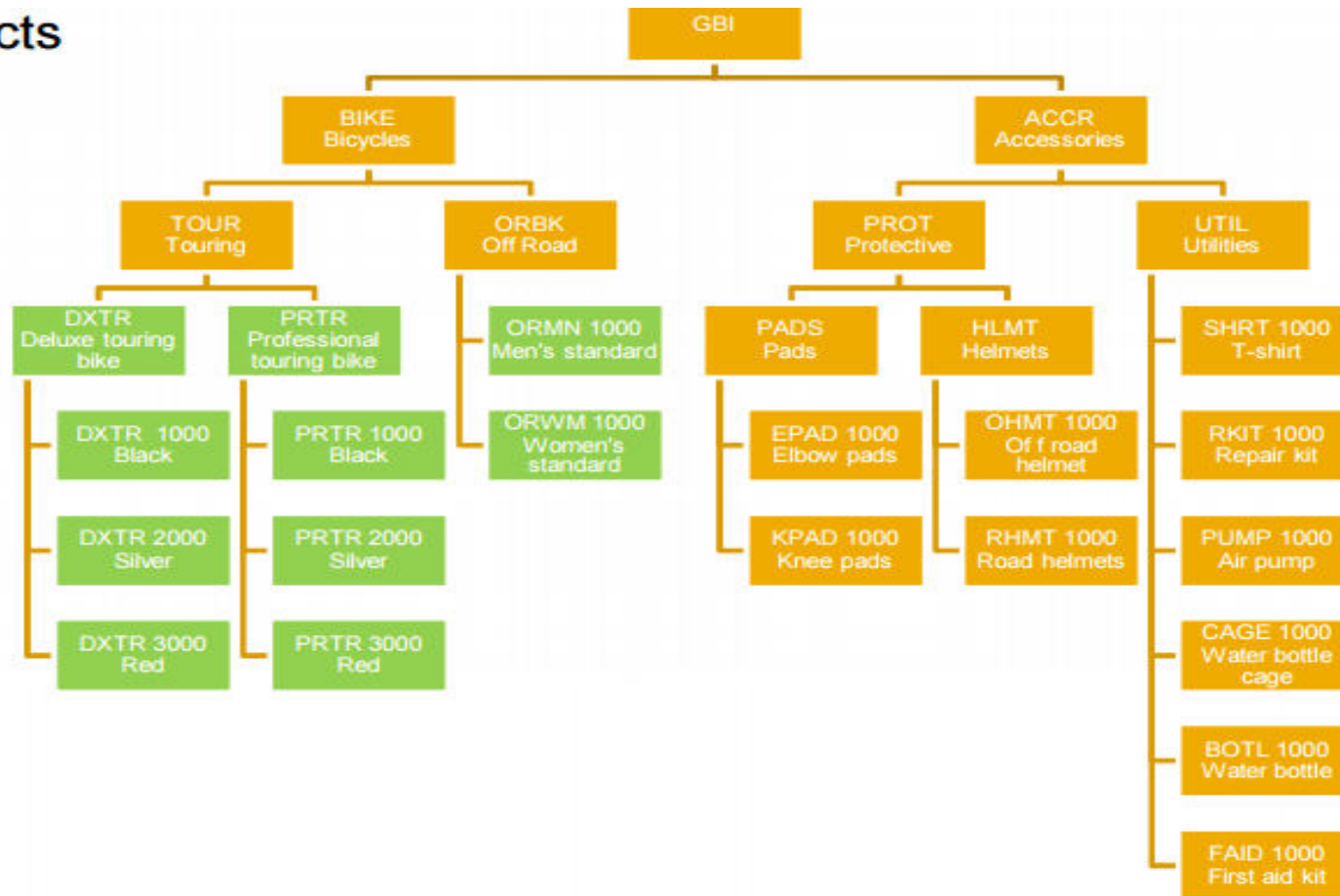
- Introduction
 - Developing a Data Generator
 - Big Data
 - Global Bike Inc.

- GBI Company



• GBI Products

Products



- Enterprise Resource Planning (ERP)
 - Integration of people, information and process
 - Improves efficiency and transparency
 - Increases profitability and reduces Total Cost of Ownership

- Enterprise Resource Planning (ERP)

- SAP ERP Financials
- SAP ERP Human Capital Management
- SAP ERP Operations
- SAP ERP Corporate solutions

- OnLine Analytical Processing (OLAP)
 - An approach to answer multidimensional analytical queries
 - Big data volumes per operation
 - Historical (2-7 years), multiple datasources
 - Generates knowledge

GBI Business Processes

➤ Order To Cash (OTC)

ERP Modules

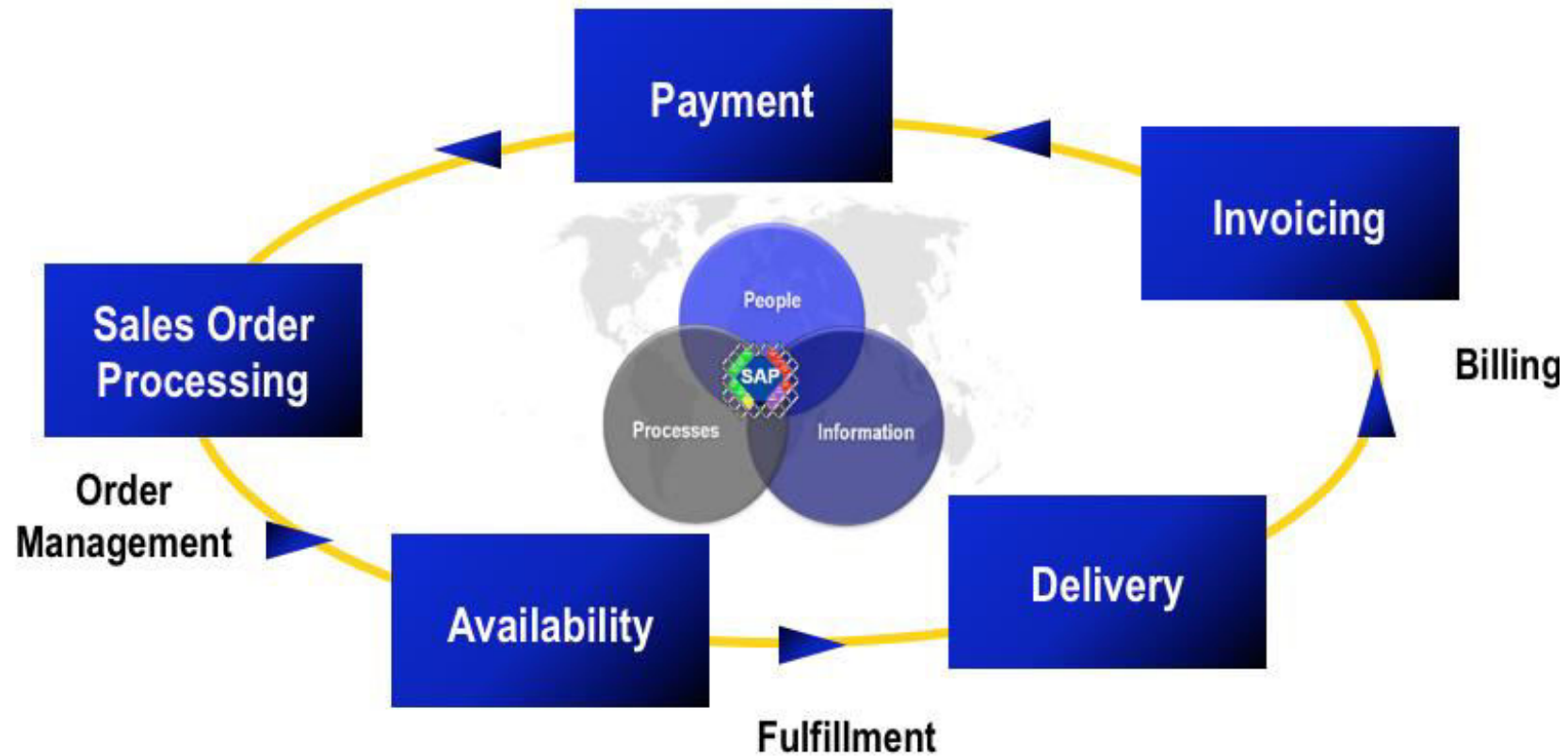
- Sales & Distribution
- Material Management
- Finance

➤ Procure To Pay

ERP Modules

- Material Management
- Finance

Order to Cash



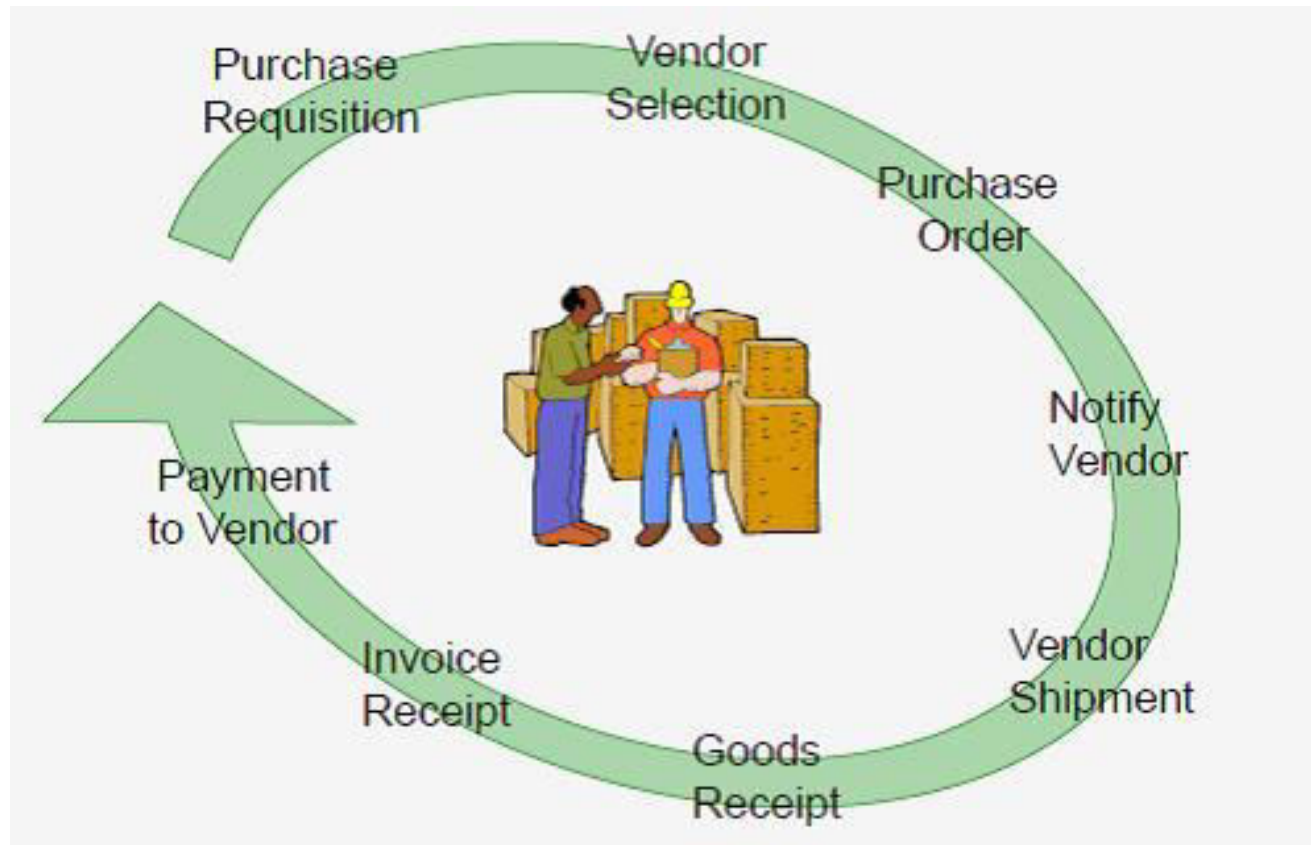
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- Order to Cash

- Process Steps

- Sales order processing
 - Availability
 - Delivery
 - Invoicing
 - Payment

•Procure to Pay



Source:victorstinga.files

Procure to Pay

➤ Steps

- Creating Suppliers
- Preparing the purchase order
- Goods Receipt
- Invoice processing

- Requirements

- Master Data

- Core data
- Basis for any business processes

Ex - Master data of Customers ,Vendors and Products

- Master data of GBI Customers

CUSTOMERS - US				
10014	NEW YORK CITY	BIG APPLE BIKES	2000	US00
18033	BOSTON	BEANTOWN BIKES	5000	US00
19073	PHILADELPHIA	PHILLY BIKES	3000	US00
20004	WASHINGTON DC	DC BIKES	11000	US00
30319	ATLANTA	PEACHTREE BIKES	4000	US00
32804	ORLANDO	THE BIKE ZONE	25011	US00
48076	DETROIT	MOTOWN BIKES	8000	US00
49504	GRAND RAPIDS	FURNITURE CITY BIKES	7000	US00
60515	CHICAGO	WINDY CITY BIKES	6000	US00
80111	DENVER	ROCKY MOUNTAIN BIKES	1000	US00
92612	IRVINE	SO CAL BIKES	9000	US00
94304	PALO ALTO	SILICON VALLEY BIKES	10000	US00
98004	SEATTLE	NORTHWEST BIKES	12000	US00

CUSTOMERS - GERMANY				
4227	LEIPZIG	DRAHTESEL	18000	DE00
16341	BERLIN	CAPITAL BIKES	16000	DE00
17389	ANKLAM	OSTSEERAD	21000	DE00
22760	HAMBURG	ALSTER CYCLING	14000	DE00
22767	HAMBURG	RED LIGHT BIKES	23000	DE00
30627	HANNOVER	CRUISER BIKES	17000	DE00
39130	MAGDEBURG	VELODOM	24000	DE00
44784	BOCHUM	FAHRPOTT	19000	DE00
60549	FRANKFURT	AIRPORT BIKES	13000	DE00
69115	HEIDELBERG	NECKARAD	20000	DE00
70825	STUTTGART	RADLELAND	22000	DE00
92275	MUNCHEN	BAVARIA BIKES	15000	DE00

- Master Data of GBI Vendors

VENDORS - US				
ATLANTA	000	OLYMPIC PROTECTIVE GEAR	101000	US00
CARLSBAD	000	REDWOOD KITS	112000	US00
CINCINNATI	000	BOOMTOWN TIRE & WHEEL	102000	US00
EDISON	000	LIGHTBULB ACCESSORY KITS	104000	US00
GRAND RAPIDS	000	RAPIDS NUTS N BOLTS	108000	US00
HOUSTON	000	SPACE BIKE COMPOSITES	105000	US00
IRVING	000	DALLAS BIKE BASICS	103000	US00
LACROSSE	000	NIGHT RIDER ALUMINUM PROD	106000	US00
MCLEAN	000	SPY GEAR	107000	US00
MIAMI	000	FUN N THE SUN SEATS N BAR	110000	US00
PORTLAND	000	GREEN BLAZERS SEATS	109000	US00
SCOTTSDALE	000	SUNNY SIDE UP TIRE	111000	US00

VENDORS - GERMANY				
AUGSBURG	000	LOHSE SCHRAUBE	118000	DE00
BIELEFELD	000	PYRAMID BIKING	114000	DE00
BRAUNSCHWEIG	000	BURGMEISTER ZUBEHÖR O	113000	DE00
DRESDEN	000	SACHSEN STAHL AG	123000	DE00
ERFURT	000	ABS BRAKES GMBH	115000	DE00
HEILBRONN	000	THICK SPOKE	119000	DE00
KARLSRUHE	000	GUMMI SCHULTZE	117000	DE00
KÖLN	000	COLOGNE BIKE SUPPLIES	122000	DE00
MANNHEIM	000	FLAT TIRE AND MORE	116000	DE00
MÜNCHEN	000	RUN & FUN	124000	DE00
SANDKRUG	000	SHELL GEAR	121000	DE00
WÜRZBURG	000	MAIN CARBON	120000	DE00

- Master Data of GBI Products

Finished Goods		
Touring Bikes (Deluxe, Professional) in three colors		
Off-Road Bikes (Men, Women)		
DELUXE TOURING BIKE (BLACK)	EN	DXTR1000
DELUXE TOURING BIKE (RED)	EN	DXTR3000
DELUXE TOURING BIKE (SILVER)	EN	DXTR2000
MEN'S OFF ROAD BIKE	EN	ORMN1000
PROFESSIONAL TOURING BIKE (BLACK)	EN	PRTR1000
PROFESSIONAL TOURING BIKE (RED)	EN	PRTR3000
PROFESSIONAL TOURING BIKE (SILVER)	EN	PRTR2000
WOMEN'S OFF ROAD BIKE EN	EN	ORWN1000

- Semi Finished Goods

CARBON COMPOSIT WHEEL ASSEMBLY	EN	CCWA1000
OFF ROAD ALUMINUM WHEEL	EN	ALWA1000
TOURING ALUMINUM WHEEL ASSEMBLY	EN	ALWA2000

- Trading Goods

ELBOW PADS	EN	EPAD1000
FIRST AID KIT	EN	FAID1000
KNEE PADS	EN	KPAD1000
OFF ROAD HELMET	EN	OHMT1000
REPAIR KIT	EN	RKIT1000
ROAD HELMET	EN	RHMT1000
T-SHIRT	EN	SHRT1000
WATER BOTTLE	EN	BOTL1000
WATER BOTTLE CAGE	EN	CAGE1000

- Raw materials

Raw Materials		
BRAKE KIT	EN	BRKT1000
CARBON COMPOSIT WHEEL	EN	CCWH1000
CHAIN	EN	CHAN1000
DERAILLEUR GEAR ASSEMBLY	EN	DGAM1000
HEX NUT 5 MM	EN	HXNT1000
LOCK WASHER 5 MM	EN	LWSH1000
MEN'S OFF ROAD FRAME	EN	OFFR1000
OFF ROAD ALUMINIUM WHEEL	EN	ORWH1000
OFF ROAD HANDLE BAR	EN	ORHB1000
OFF ROAD SEAT KIT	EN	OFSK1000
OFF ROAD TIRE	EN	ORTR1000
OFF ROAD TUBE	EN	ORTB1000
PACKAGING	EN	PKG1000
PEDAL ASSEMBLY	EN	PEDL1000
SOCKET HEAD BOLT 5X20MM	EN	BOLT1000
TOURING ALUMINIUM WHEEL	EN	TRWH1000
TOURING FRAME-BLACK	EN	TRFR1000
TOURING FRAME-RED	EN	TRFR3000
TOURING FRAME-SILVER	EN	TRFR2000
TOURING HANDLE BAR	EN	TRHB1000
TOURING SEAT KIT	EN	TRSK1000
TOURING TIRE	EN	TRTR1000
TOURING TUBE	EN	TRTB1000
WARRANTY DOCUMENT	EN	WDOC1000
WOMEN'S OFF ROAD FRAME	EN	OFFR2000

- Tools

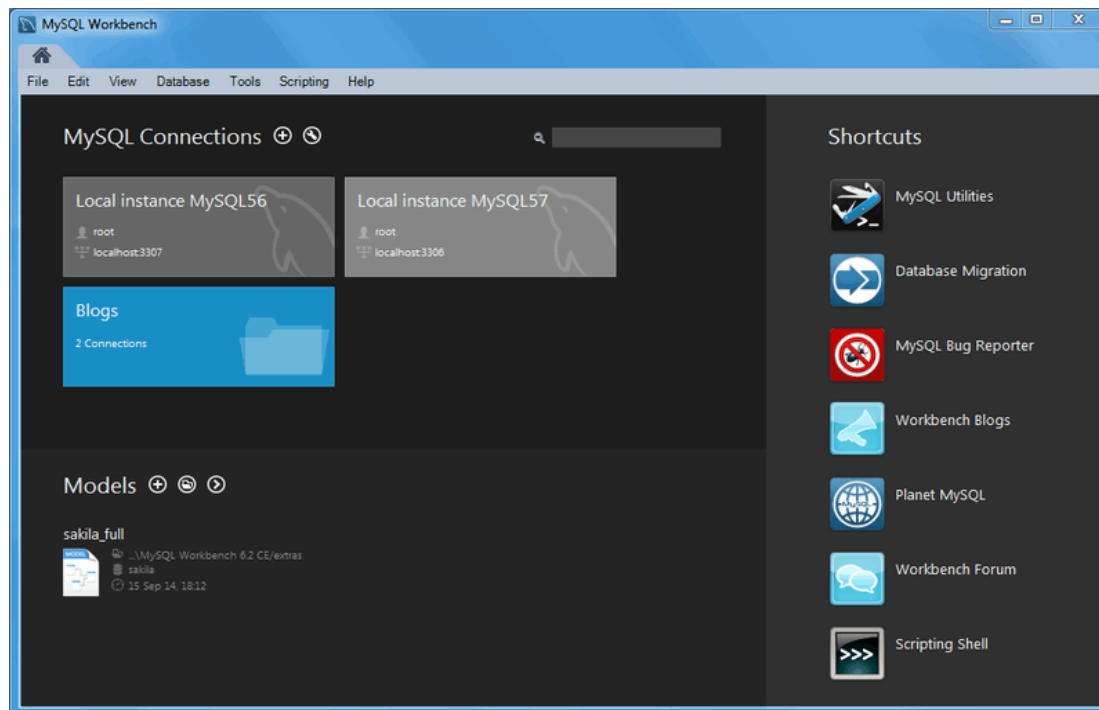
- MySQL Workbench

- Benerator (open source tool)

- Secure WAMP

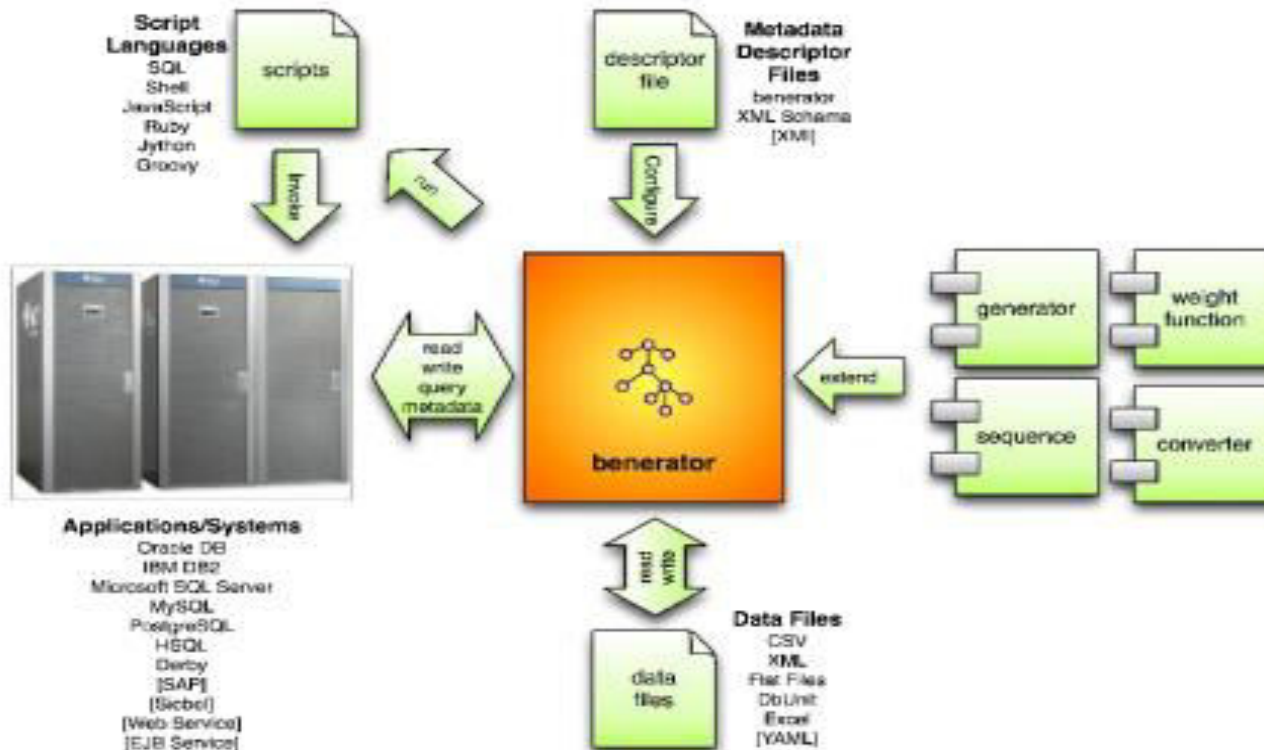
- My SQL

➤ Open source Relational Database system



Benerator Tool

- Test data generation Tool
- Huge volume of data
- Easily Customizable
- Reduces time
- Supports Database Systems, XML, Excel sheet, CSV etc.

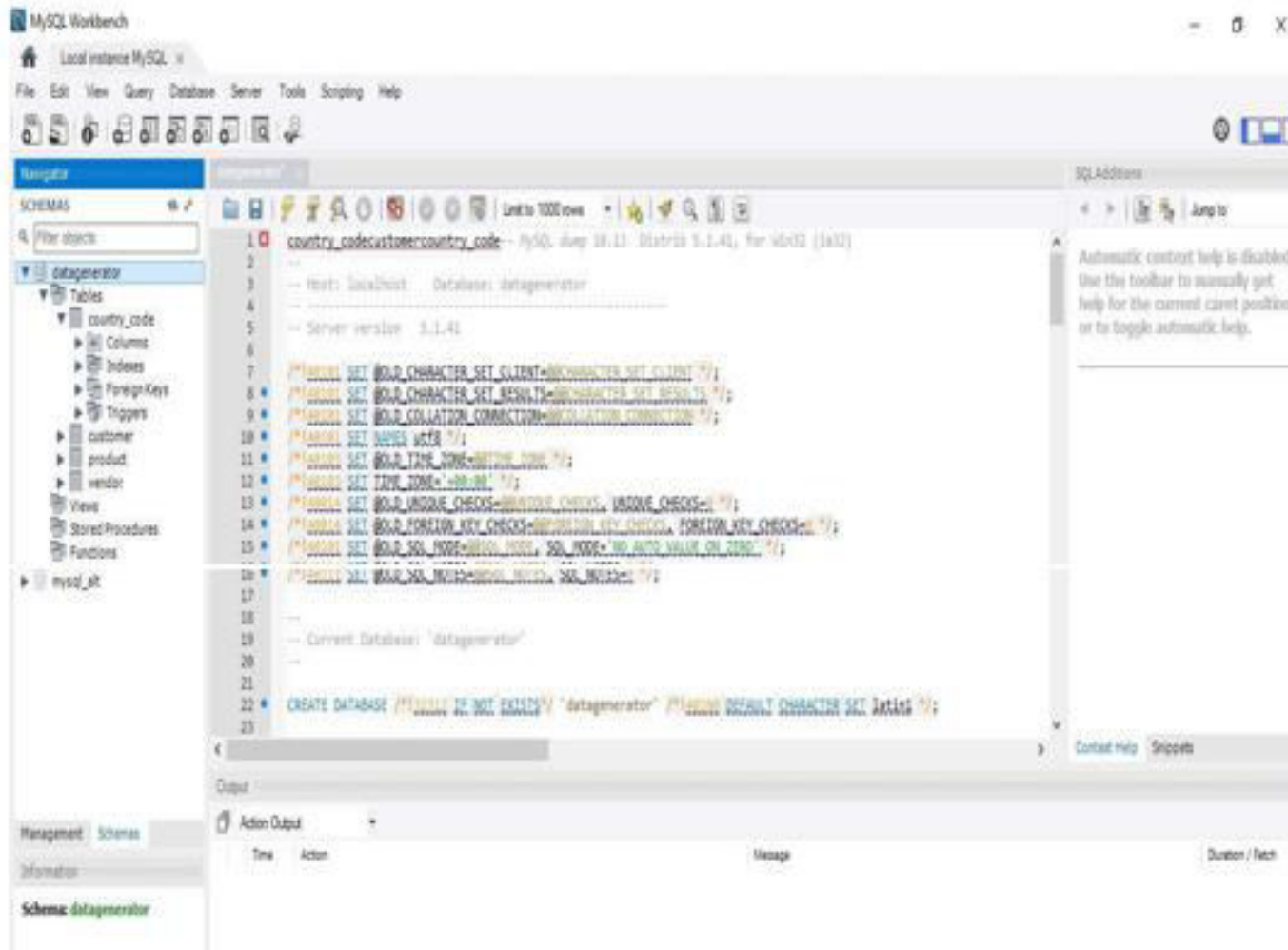


Benerator Block Diagram

Reference: <http://databene.org/download/databene-benerator-manual-0.7.6.pdf>

- Installation of My sql Instructions

- Download and Install My sql workbench
- Set user name and password for the database.
- Create a database
- create customer, product, vendor, material master data tables for US and Germany and insert the given values into the tables.



- Installation of Benerator Tool Instructions

- Download the Benerator tool using the link
http://bergmann-it.de/download/download_benerator
- Set benerator_Home and Java_home environment variables
- Set maven variables in system variables

- Installation of Benerator Tool Instructions

- Start project wizard on command line by typing

benerator-wizard-bat

- Depending on our language settings, GUI window will be opened as shown.

Project Name	datagen		Project Type	'Hello World' example	
Project Folder	/Users/me/Documents/datagen				
(Maven) Group Id	com.my		Version Number	1.0	
Options	<input type="checkbox"/> Create Eclipse Project <input type="checkbox"/> Overwrite <input type="checkbox"/> Offline				
Database Product	Firebird (Jaybird Driver)		Driver	org.firebirdsql.jdbc.FBDriver	
URL	jdbc:firebirdsql:localhost/3050:shop		Schema		
User	sysdba		Password	*****	
	Test Connection		Snapshot	DbUnit file	
'create tables' script	/Users/volker/Documents/databene/l		'drop tables' script	/Users/volker/Documents/databene/l	
Encoding	UTF-8		Line Separator	\n	
Locale	de_DE		Dataset/Country	DE	
<div> <div>Create</div> <div>Cancel</div> </div>					

- Project creation

- In the GUI, select project type as populate database
- Create new project folder
- Select the database product as My SQL.
- Enter the driver details :
`jdbc:mysql://localhost:3306/<database name>`
- Enter username and password

- Project creation

- Click on create a project, which will produce benerator.xml, pom.xml, read me, base.dbunit files in the target project folder
- Benerator.xml is a descriptor file which is used data generation
- POM.xml contains plugins, project dependencies, project versions etc.
- Read me file give instructions to generate data

- Data generation

- generator descriptor file is XML based
- Document root is <setup> element
- <generate> elements are used to generate data from scratch
- It provides different configuration options for data generation

- Methodology

- Entities may be generated completely synthetically
- Entities as well as their attributes can be imported from storage systems or data files which serve as prototypes for huge volume data generation

- Methodology

- As we have master data tables of customer, product, vendor and material in the database
- we have queried the customer id and product id by using <reference> elements
- This will produce the required data to the sales order table

- Methodology

```
<generate type="salesorders_de" count="10000"  
  consumer="db,ConsoleExporter">  
  
  <id name="orderid" type="integer" />  
  
  <reference name="customerid" type="int" targetType="salesorders_de"  
    source="db" selector="select id from customer_de" nullable="false"  
    cyclic="true" distribution="random"/>  
  
  <reference name="productid" type="int" targetType="salesorders_de"  
    source="db" selector="select pid from product_de" nullable="false"  
    cyclic="true" distribution="random"/>  
  
  <attribute name="quantity" type="integer" min="0" max="10"  
    distribution="cumulated" />  
  
  <attribute name="sale_time" type="datetime" generator="dtGen"/>  
  
</generate>
```

- Methodology

- Execution of above code in benerator.xml using the command `mvn benerator : generate` in command prompt will produce 10000 rows in the salesorder table
- we can export the file into csv, xls or other file formats or selecting the database as receiving object in consumer element

salesorders_us - Microsoft Excel

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
	orde rid	cust ome rid	pro duc tid	quant ity	sale_time	custo merid	post alcode	city	customer nam e	countr ycode	pname	code	pnum	type	price
1	1	4	1	6	23-12-2011	4000	30319	ATLANTA	PEACHTREE BIKE	US00	AIR PUMP	EN	PUMP100	TG	40
2	2	6	11	8	24-01-2012	6000	60515	CHICAGO	WINDY CITY BIKE	US00	DELUXE TOURING BI	EN	DXTR1000	FG	400
3	3	1	4	6	26-02-2011	1000	80111	DENVER	ROCKY MOUNTA	US00	KNEE PADS	EN	KPAD1000	TG	15
4	4	12	7	6	20-06-2012	12000	98004	SEATTLE	NORTHWEST BIK	US00	ROAD HELMET	EN	RHMT100	TG	20
5	5	1	11	5	22-07-2012	1000	80111	DENVER	ROCKY MOUNTA	US00	DELUXE TOURING BI	EN	DXTR1000	FG	400
6	6	13	5	6	02-07-2012	25011	32804	ORLANDO	THE BIKE ZONE	US00	OFF ROAD HELMET	EN	OHMT100	TG	20
7	7	12	7	5	01-11-2011	12000	98004	SEATTLE	NORTHWEST BIK	US00	ROAD HELMET	EN	RHMT100	TG	20
8	8	10	7	6	21-01-2014	10000	94304	PALO	ALTOSILICON VAL	US00	ROAD HELMET	EN	RHMT100	TG	20
9	9	12	2	6	09-04-2012	12000	98004	SEATTLE	NORTHWEST BIK	US00	ELBOW PADS	EN	EPAD1000	TG	20
10	10	7	10	7	25-12-2012	7000	49504	GRAND R	FURNITURE CITY	US00	WATER BOTTLE CAG	EN	CAGE1000	TG	3
11	11	7	8	3	30-11-2013	7000	49504	GRAND R	FURNITURE CITY	US00	T-SHIRT	EN	SHRT1000	TG	10
12	12	13	5	6	13-01-2011	25011	32804	ORLANDO	THE BIKE ZONE	US00	OFF ROAD HELMET	EN	OHMT100	TG	20
13	13	4	7	5	16-04-2013	4000	30319	ATLANTA	PEACHTREE BIKE	US00	ROAD HELMET	EN	RHMT100	TG	20
14	14	6	18	5	10-03-2011	6000	60515	CHICAGO	WINDY CITY BIKE	US00	WOMEN'S OFF ROAD	EN	ORWN100	FG	320

Salesorder data

• Business Analysis and Results

- Analysis of past performance
- Used to derive new insights and understanding
- Explore the unknown and discover new patterns
- Types :
 - Descriptive
 - Predictive
 - Prescriptive

- Business Analysis and Results

- Descriptive Analysis :

- what happened in the past

- Ex : Dashboards, scorecards

- Predictive :

- what will happen

- Ex : Data mining, Forecasting

- Prescriptive :

- what should i do

- Ex : optimization, simulation

Count of pname	Year						
Product		2011	2012	2013	2014	2015	Grand Total
PROFESSIONAL TOURING BIKE (RED)		156	152	115	145	12	580
AIR PUMP		123	151	147	144	9	574
DELUXE TOURING BIKE (BLACK)		111	127	130	128	10	506
DELUXE TOURING BIKE (RED)		131	118	158	130	10	547
DELUXE TOURING BIKE (SILVER)		130	151	132	149	12	574
ELBOW PADS		121	146	130	131	10	538
FIRST AID KIT		149	168	133	142	13	605
KNEE PADS		149	135	121	143	5	553
MEN'S OFF ROAD BIKE		131	127	159	141	14	572
OFF ROAD HELMET		122	126	138	140	16	542
PROFESSIONAL TOURING BIKE (BLACK)		130	132	140	124	11	537
PROFESSIONAL TOURING BIKE (SILVER)		151	148	115	146	10	570
REPAIR KIT		147	140	136	116	13	552
ROAD HELMET		156	150	110	111	13	540
T-SHIRT		138	128	133	135	9	543
WATER BOTTLE		130	127	142	164	21	584
WATER BOTTLE CAGE		128	139	135	146	11	559
WOMEN'S OFF ROAD BIKE EN		121	126	133	136	8	524
Grand Total		2424	2491	2407	2471	207	10000

YoY sales volume in germany

Count of pname	Year					
Product	2011	2012	2013	2014	2015	Grand Total
PROFESSIONAL TOURING BIKE (RED)	134	145	151	116	8	554
AIR PUMP	148	138	113	144	10	553
DELUXE TOURING BIKE (BLACK)	152	147	148	124	13	584
DELUXE TOURING BIKE (RED)	128	128	142	148	9	555
DELUXE TOURING BIKE (SILVER)	138	117	127	141	13	536
ELBOW PADS	147	136	126	139	10	558
FIRST AID KIT	128	119	153	150	8	558
KNEE PADS	148	163	115	140	9	575
MEN'S OFF ROAD BIKE	138	143	120	146	12	559
OFF ROAD HELMET	133	145	145	129	11	563
PROFESSIONAL TOURING BIKE (BLACK)	132	142	141	149	8	572
PROFESSIONAL TOURING BIKE (SILVER)	130	124	137	140	11	542
REPAIR KIT	116	141	130	153	10	550
ROAD HELMET	130	112	120	122	10	494
T-SHIRT	142	140	119	141	7	549
WATER BOTTLE	147	149	144	135	15	590
WATER BOTTLE CAGE	140	126	136	133	8	543
WOMEN'S OFF ROAD BIKE EN	134	135	149	139	8	565
(blank)						
Grand Total	2465	2450	2416	2489	180	10000

YoY sales volume in USA

Count of pname	City											
Product	ANKLAM	BERLIN	BOCHUM	FRANKFURT	HAMBURG	HANNOVER	HEIDELBERG	LEIPZIG	MAGDEBURG	MUNCHEN	STUTT GART	Grand Total
PROFESSIONAL TOURING BIKE (RED)	59	45	55	65	105	40	43	32	46	40	50	580
AIR PUMP	54	55	53	47	88	40	33	41	58	51	54	574
DELUXE TOURING BIKE (BLACK)	43	44	45	47	88	46	43	33	32	37	48	506
DELUXE TOURING BIKE (RED)	56	51	38	46	86	45	45	40	47	49	44	547
DELUXE TOURING BIKE (SILVER)	43	52	44	57	98	37	45	47	48	59	44	574
ELBOW PADS	42	44	37	41	101	44	51	47	36	39	56	538
FIRST AID KIT	52	43	55	55	110	48	51	47	54	43	47	605
KNEE PADS	46	42	50	50	98	50	52	44	40	43	38	553
MEN'S OFF ROAD BIKE	56	39	44	47	93	51	52	57	43	39	51	572
OFF ROAD HELMET	53	48	40	40	98	52	46	42	45	35	43	542
PROFESSIONAL TOURING BIKE (BLACK)	39	46	35	55	86	37	47	49	57	41	45	537
PROFESSIONAL TOURING BIKE (SILVER)	53	46	33	56	103	47	48	46	50	42	46	570
REPAIR KIT	46	44	40	57	84	42	43	41	58	40	57	552
ROAD HELMET	48	43	33	37	87	47	41	49	54	42	59	540
T-SHIRT	48	46	40	46	79	48	45	47	50	54	40	543
WATER BOTTLE	50	47	58	41	91	59	40	53	55	45	45	584
WATER BOTTLE CAGE	42	50	46	58	88	46	52	39	50	48	40	559
WOMEN'S OFF ROAD BIKE EN	40	45	55	42	94	46	48	40	41	36	37	524
Grand Total	870	830	801	887	1677	825	825	794	864	783	844	10000

Regional-wise sales in Germany

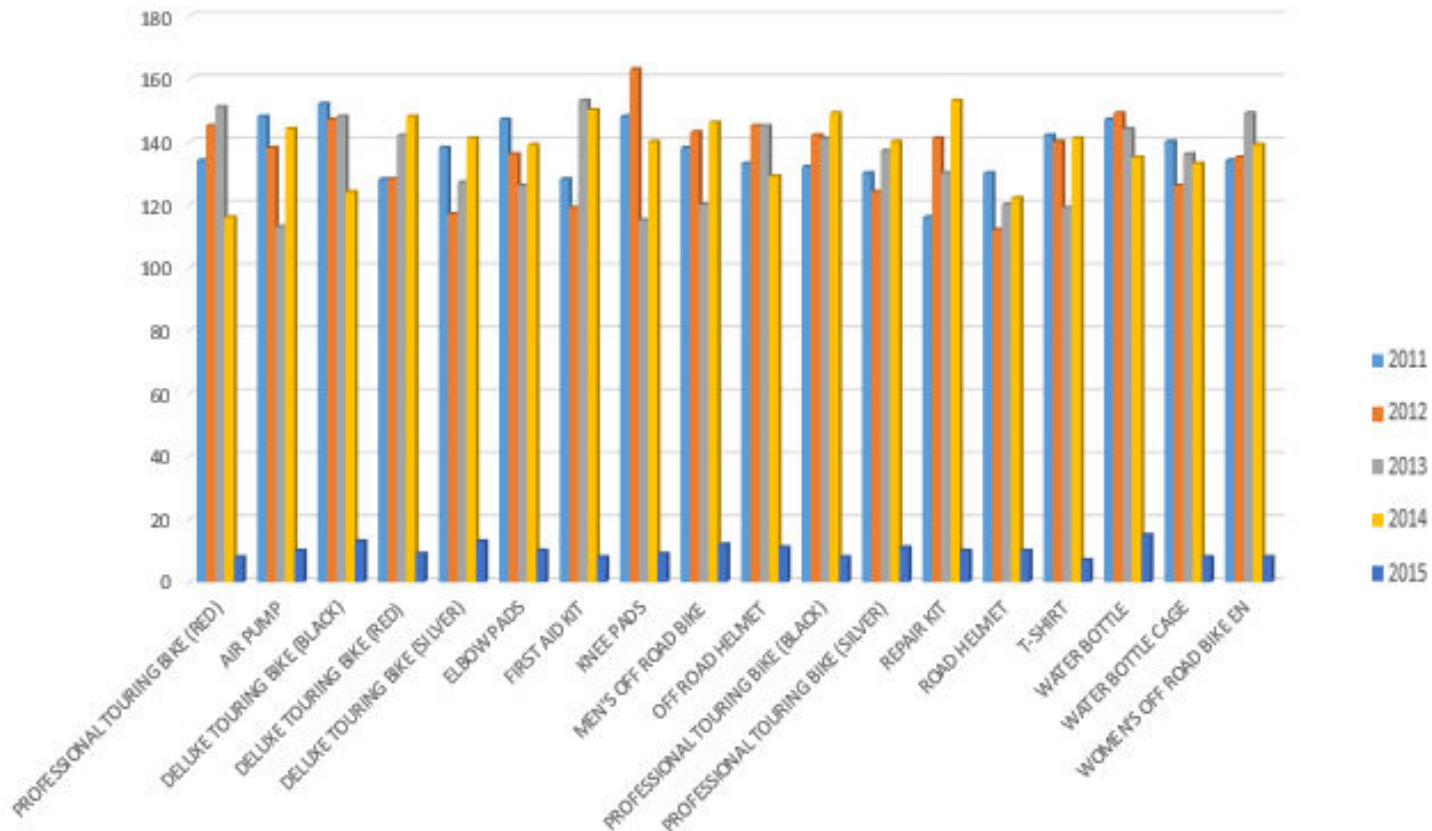
Count of pname	City													
Product	ATLANTA	BOSTON	CHICAGO	DENVER	DETROIT	GRAND R	IRVINE	NEW YORK	ORLANDO	PALO	PHILADEL	SEATTLE	WASHING	Grand Total
PROFESSIONAL TOURING BIKE	48	37	41	40	48	58	41	40	40	48	36	42	35	554
AIR PUMP	49	37	27	47	53	46	35	36	41	46	40	46	50	553
DELUXE TOURING BIKE (BLACK	39	44	54	52	49	39	42	39	41	51	43	55	36	584
DELUXE TOURING BIKE (RED)	42	44	44	41	37	59	48	33	51	31	43	33	49	555
DELUXE TOURING BIKE (SILVER	37	41	40	42	36	36	46	44	46	44	42	39	43	536
ELBOW PADS	42	34	54	34	40	38	45	36	55	47	54	41	38	558
FIRST AID KIT	33	46	54	47	51	38	46	43	49	42	47	27	35	558
KNEE PADS	36	39	48	52	37	43	41	49	60	40	53	47	30	575
MEN'S OFF ROAD BIKE	54	34	51	47	30	44	41	34	42	47	40	55	40	559
OFF ROAD HELMET	41	46	45	54	31	41	38	37	48	33	47	50	52	563
PROFESSIONAL TOURING BIKE	39	55	37	44	38	51	55	50	46	38	50	38	31	572
PROFESSIONAL TOURING BIKE	40	45	37	42	42	31	43	41	40	44	51	48	38	542
REPAIR KIT	41	35	44	47	41	50	47	49	42	37	42	42	33	550
ROAD HELMET	27	34	32	43	36	56	38	40	35	33	36	39	45	494
T-SHIRT	40	39	49	35	51	35	35	42	40	50	36	55	42	549
WATER BOTTLE	37	42	52	39	58	38	57	47	35	48	37	53	47	590
WATER BOTTLE CAGE	63	36	34	43	35	47	47	40	36	30	51	39	42	543
WOMEN'S OFF ROAD BIKE EN	48	43	41	51	37	41	49	47	41	51	43	32	41	565
Grand Total	756	731	784	800	750	791	794	747	788	760	791	781	727	10000

Regional-wise sales in USA

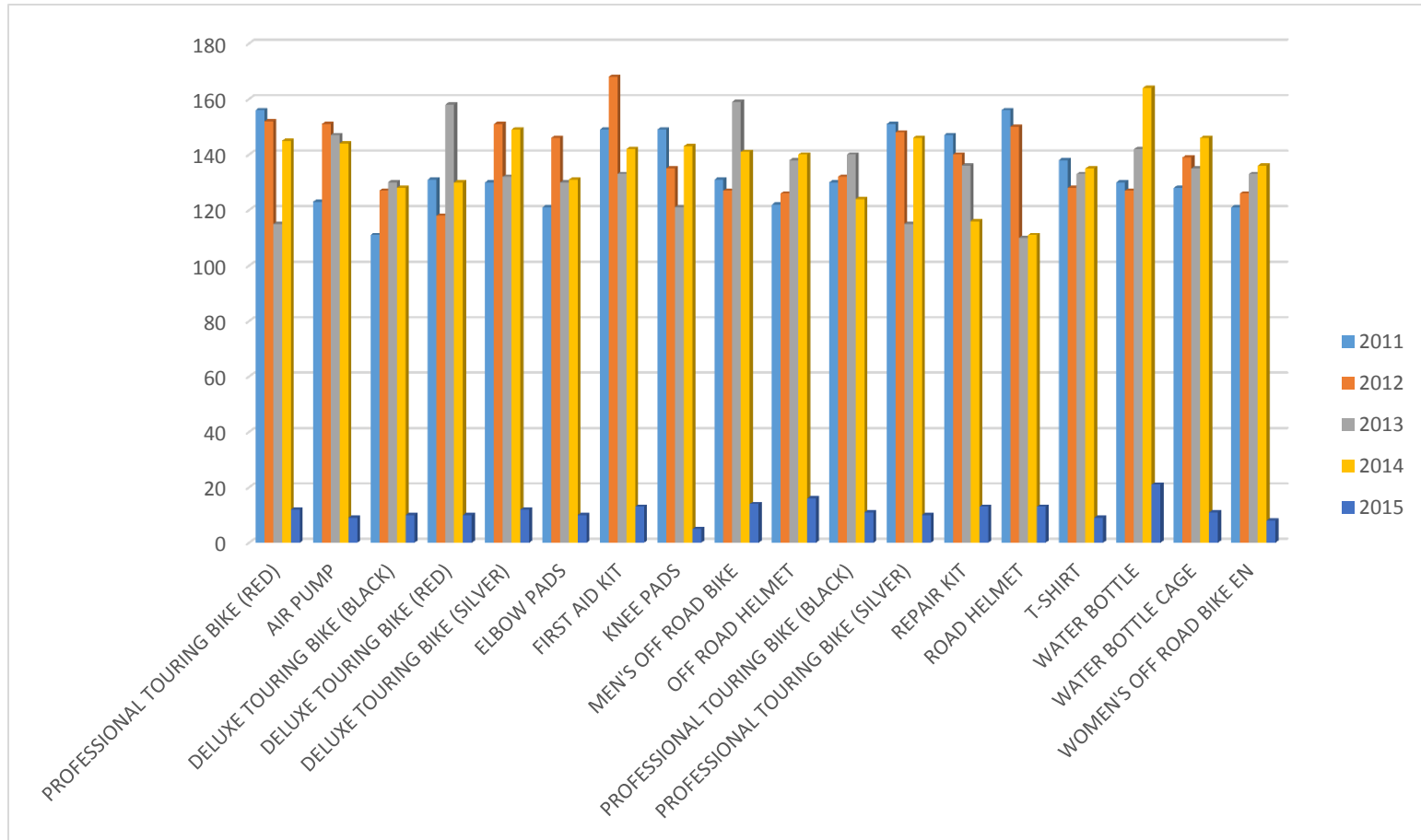
Year	Total Revenue	Sales Quantity
2011	\$ 1,06,13,22,200.00	49910
2012	\$ 1,06,12,84,200.00	49897
2013	\$ 1,06,07,15,100.00	49853
2014	\$ 1,05,92,56,700.00	49820
2015	\$ 1,04,42,99,100.00	49121

Year	Total Revenue	Sales Quantity
2011	€ 99,18,34,700.00	49923
2012	€ 99,04,73,200.00	49865
2013	€ 99,08,11,700.00	49882
2014	€ 99,06,19,600.00	49873
2015	€ 98,73,74,000.00	49739

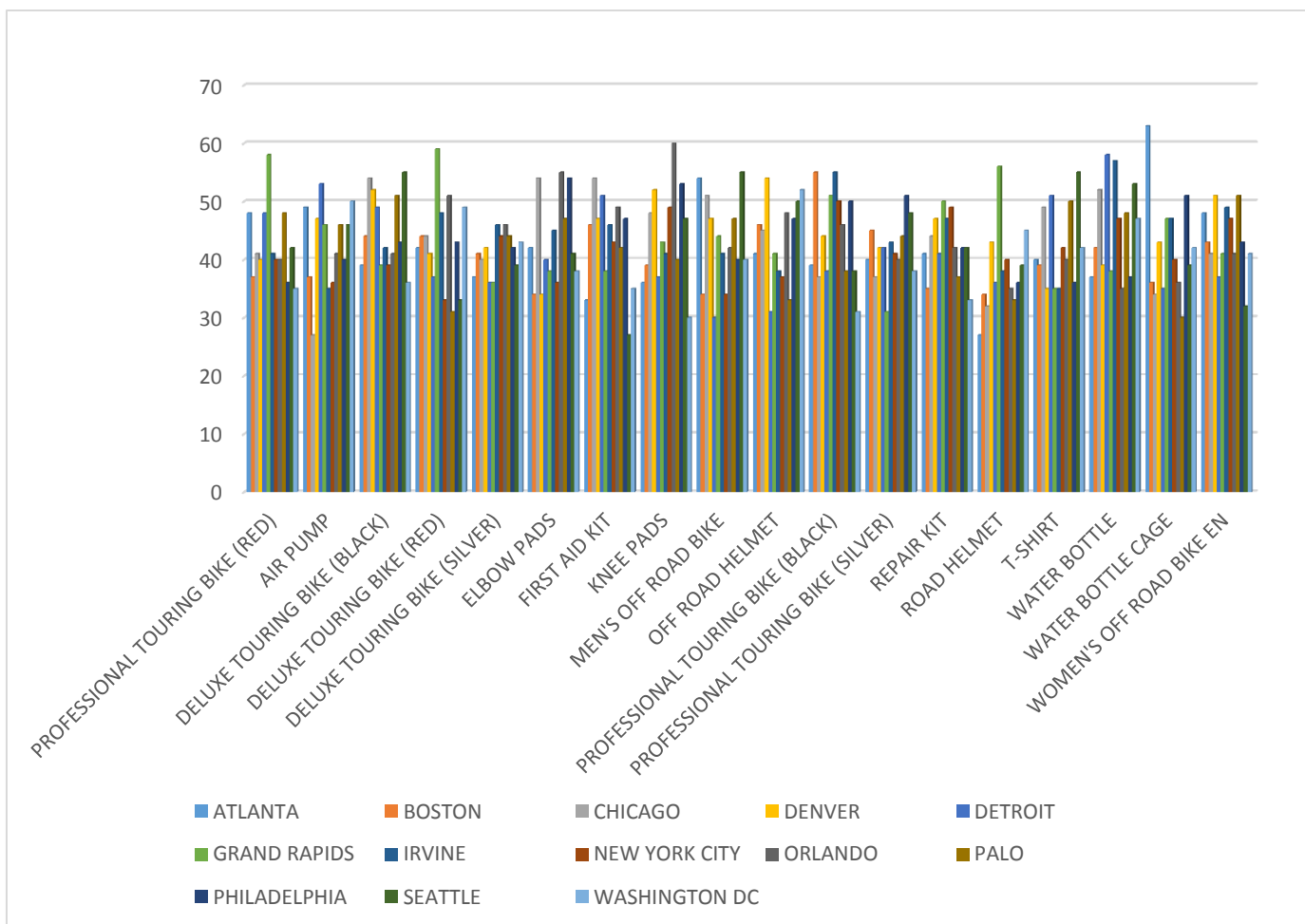
Total Revenue in USA and Germany



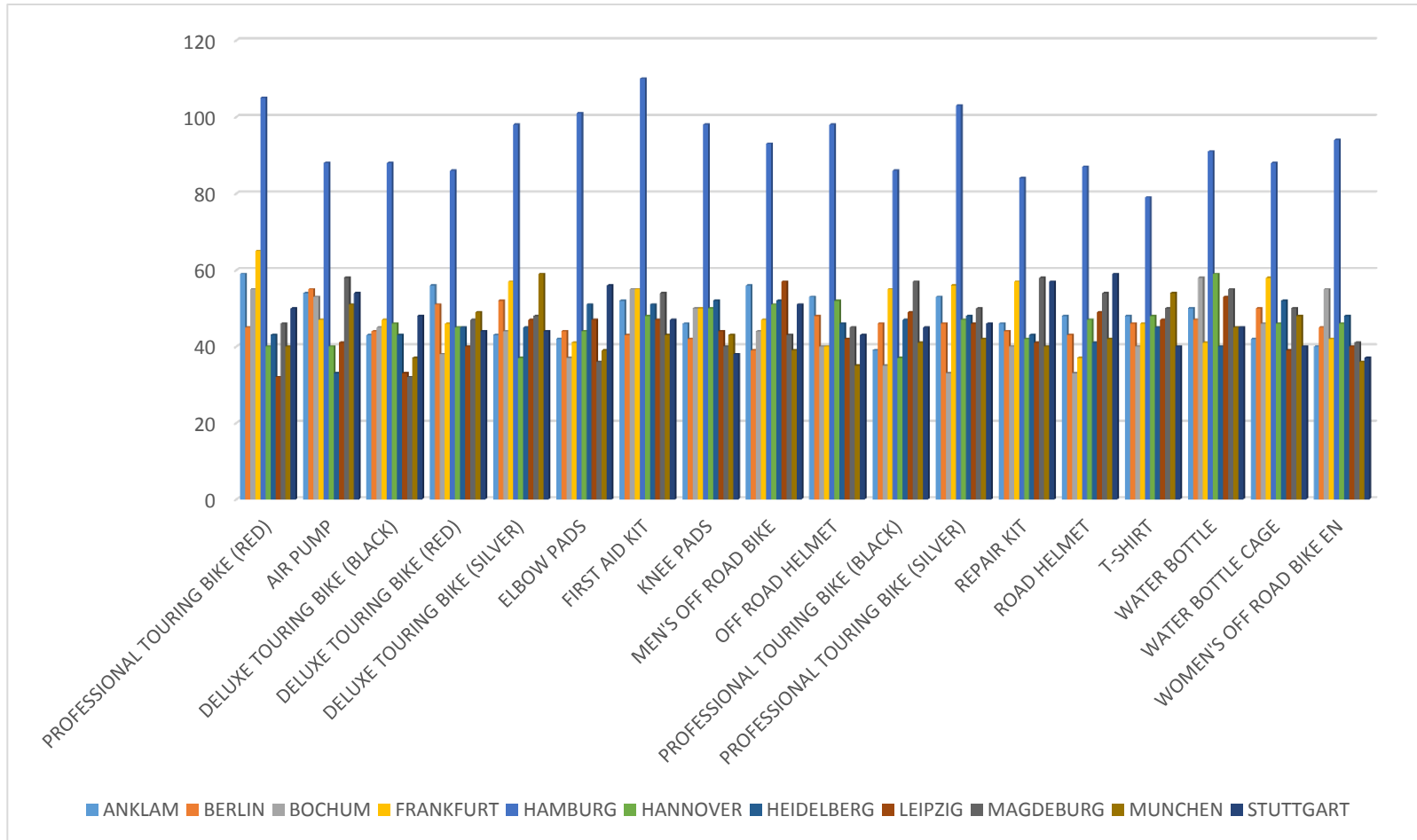
Product wise sales in Germany



Product wise sales in USA



Regional-wise sales graph in USA



Regional-wise sales graph in Germany

Conclusion

- As per the requirements and data types given by the user, benerator has generated the data
- Data has analysed and the outcome has been reported in the graphs

References

- <http://databene.org/databene-benerator>
- Synthetic data generation using benerator tool
<https://csiweb.ucd.ie/files/UCD-COI-2013-03.pdf>
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Thank You