

**Dr. Ali AlSoufi**  
**Associate Professor, Dept of Information**  
**Systems, University of Bahrain**



**Ali AlSoufi** is an Associate professor of Information Systems at University of Bahrain. He has earned his PhD in computer science in 1994 from Nottingham University, UK. Worked for Bahrain Telecom Co for 8 years as a Senior Manager Application Programme, where he overlooked number of mega IS Application projects. Worked at Arab Open University as Director of IT program and Assistant Director for Business Development during 2007-2010. He is a PT consultant in Bahrain Information and e-Government Authority (iGA) in the area of Enterprise Architecture and Strategic Planning. He is an active member of the Bahrain National ICT Governance Committee. His specializations is Strategic IT Planning and Governance, IT project management, Enterprise Architecture and Information Systems in Organization.

**Paper Title:** How IoT Complements Big Data concept to enhance students services and improve management decisions making at University of Bahrain



# **HOW IOT COMPLEMENTS BIG DATA CONCEPT TO ENHANCE STUDENT'S SERVICES AND IMPROVE MANAGEMENT DECISIONS MAKING AT UNIVERSITY OF BAHRAIN**

**DR. ALI ALSOUFI**

**COLLEGE OF INFORMATION TECHNOLOGY,**

**UNIVERSITY OF BAHRAIN**

**1 OCTOBER 2018**

# AGENDA

- UOB Background & Stats
- UOB Management Dashboard
- IOT Applications in Education
- Case of Student attendance and IOT
- The Proposed Architecture
- Possible Scenarios and Benefits
- Conclusion



# ABOUT UNIVERSITY OF BAHRAIN

- NATIONAL UNIVERSITY, WITH 10 COLLEGES
- MORE THAN 25,000 STUDENTS
- ADMISSION OF 5000–7000 STUDENTS/YEAR
- ANNUAL BUDGET (APPROX. BD 50M)
- COST OF EACH STUDENT (APPROX. 2000/YEAR)
- AVERAGE DROPOUTS 1500/YEAR
- YEARS OF HEAVY DROPOUTS (2<sup>ND</sup> AND 3<sup>RD</sup>)



# BIG DATA AND UOB MANAGEMENT DASHBOARD

BUILT ON HISTORICAL/OPERATIONAL DATA WITH REAL TIME ANALYSIS AND FORECASTING,

- Students performance
- Grade analysis against courses, lecturers, etc.
- Students at Risk analysis
- Students in Black Hole !!
- Dropout/dismissal and Graduation analysis
- Faculty and other resources analysis
- Students attendance analysis?





# **SAMPLE VIEWS OF UOB MANAGEMENT DASHBOARD**

## SEMESTER STATISTICS DASHBOARD

### COLLEGE

- ☐ Bahrain Teachers College
- ☐ College of Applied Studies
- ☐ College of Arts
- ☐ College of Business Administration
- ☐ College of Engineering
- ☐ College of Health Sciences

### DEPARTMENT

- ☐ Accounting
- ☐ Administration Programs
- ☐ Allied Health
- ☐ Arabic and Islamic Studies
- ☐ Arabic Language and Islamic Studies
- ☐ Architecture and Interior Design

### DEGREE

- ☐ Achievement Certificate for Visitor
- ☐ Associate Diploma
- ☐ B.Sc.
- ☐ Master
- ☐ Ph.D.

### PROGRAM

- ☐ Applied Studies
- ☐ Associate Diploma in Applied Learning
- ☐ Associate Diploma in Business Administration
- ☐ Associate Diploma in Commercial Studies

### ACADEMIC\_LOAD\_TYPE

- ☐ Excellence
- ☐ Normal Student
- ☐ To Be Graduated
- ☐ Under Probation

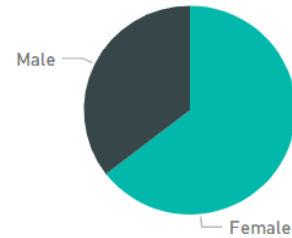
### REGISTERED LOAD

- ☐ Normal
- ☐ Under Academic Load

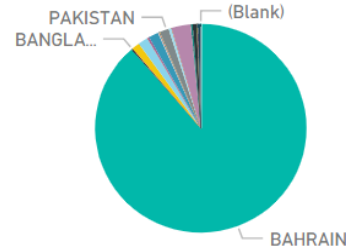
### TOTAL REGISTERED



### GENDER



### NATIONALITY



### ACADEMIC\_STATUS

- ☐ (Blank)
- ☐ FIRST PROBATION
- ☐ ON PROBATION
- ☐ ON PROBATION / SPECIAL STUDENT
- ☐ SECOND PROBATION

### ENROLLMENT

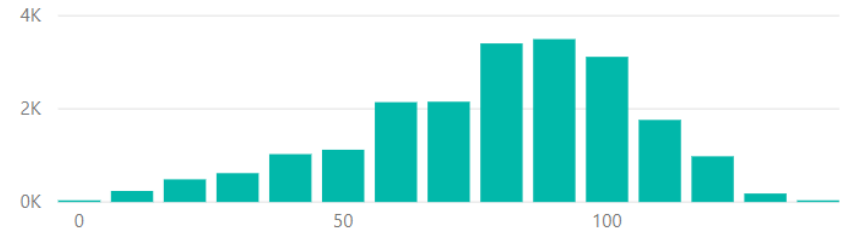
- ☐ DISCIPLINARY DISMISSAL
- ☐ DISCIPLINARY SUSPENDED 2 SEMESTERS
- ☐ DISCIPLINARY SUSPENSION (ONE SEMESTER)
- ☐ DISMISSED
- ☐ DISMISSED FROM BTC COLLEGE
- ☐ Enrolled

2017 - 2

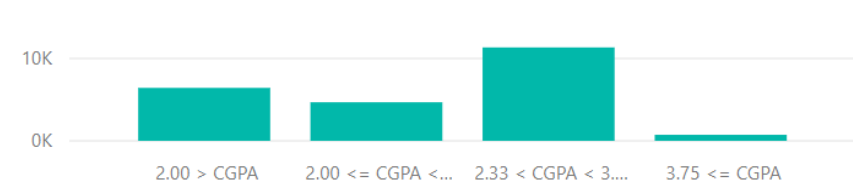
### STUDENT DATA

STUNBR	NAME	PROGRAM	CGPA	REGIS
20012033	ALI JASIM MOHAMED...	Ph.D. in Public Law	3.66	
19992078	ALI ABBAS AHMED AL...	Ph.D. in Public Law	3.67	
20028836	MOHAMED ABDULLA ...	Ph.D. in Public Law	3.33	
20144087	HAJRA FAQIR MOHA...	B.Sc. in Accounting - Major	2.58	
20146028	JAREER ABEDIN MD Z...	B.Sc. in Accounting - Major	3.18	
20101238	REEM HASAN HABIB ...	B.Sc. in Business Management - Major	2.16	
20106084	ABDULHAMEED ABDU...	L.L.B. in Law	2.04	
20110159	MAHA MAHMOOD A...	B.A. in English Language and Literatu...	2.07	
20114161	ADEEL ABEDALAZIZ A...	B.A. in Mass Communication	3.31	
20114479	KHALID MOHAMMAD...	L.L.B. in Law	3.21	
20120136	AMNA AREF MOHAM...	B.A. in Sociology	2.40	
20121139	NOOR FARAJ EBRAHI...	L.L.B. in Law	2.37	
Total			55,661.49	276

### PROGRESS %



### CGPA



SMS STATS

SMS STATS 2

SMS GRADES

GRADUATES DASHBOARD

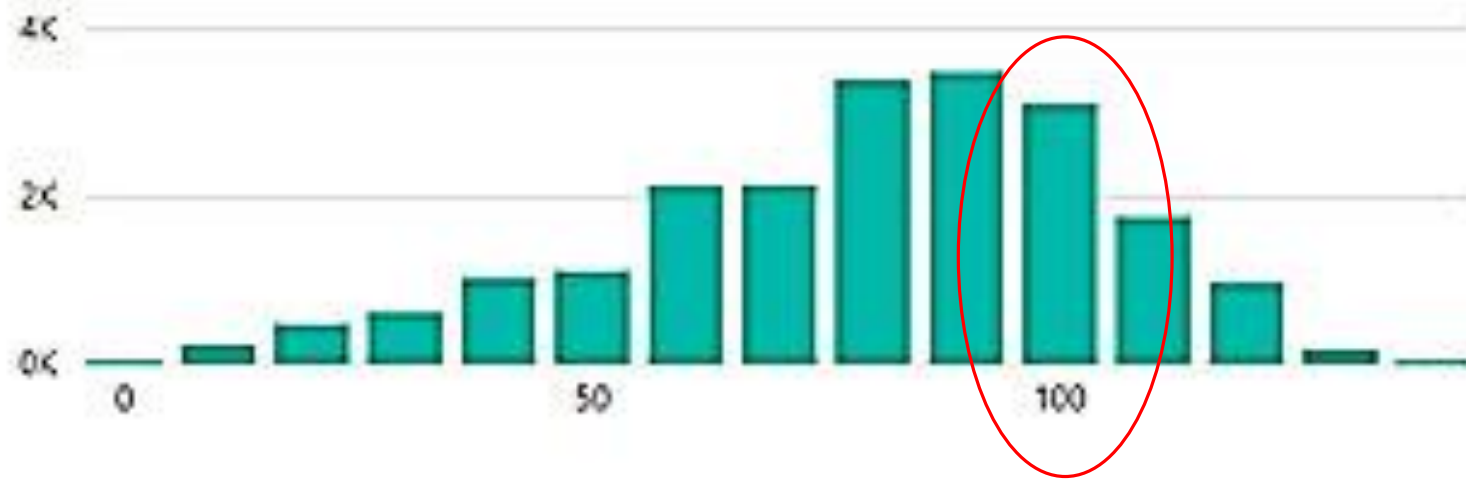
GRADUATES DASHBOARD 2

DISMISSED DASHBOARD

DISMISSED DASHBOARD 2

FILTERS

### PROGRESS %



### CGPA





SEMESTER STATISTICS DASHBOARD

2017 - 2

COLLEGE

All

DEPARTMENT

All

DEGREE

All

PROGRAM

All

Total Students

25.39K

Count of STUNBR

Graduated

986

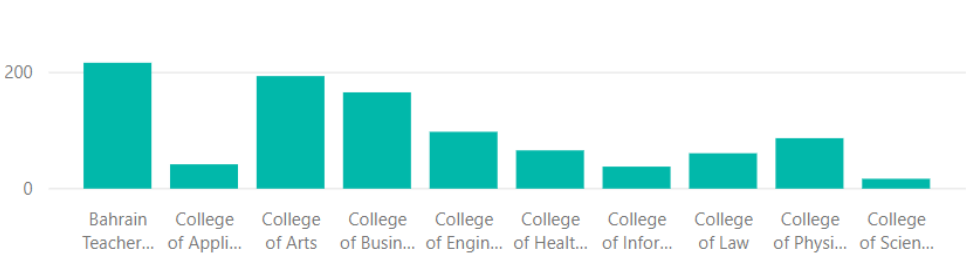
Count of STUNBR

Dismissed

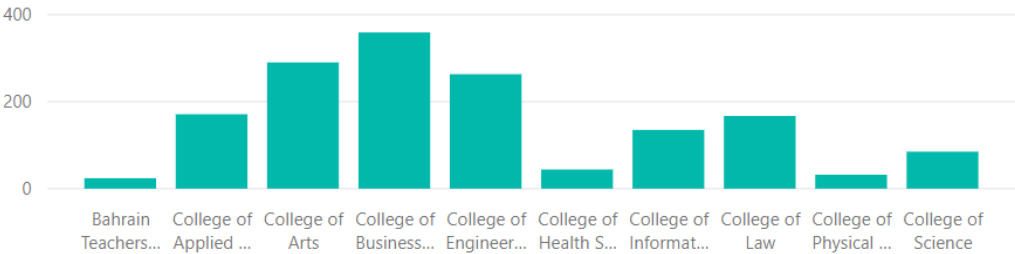
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Count of STUNBR

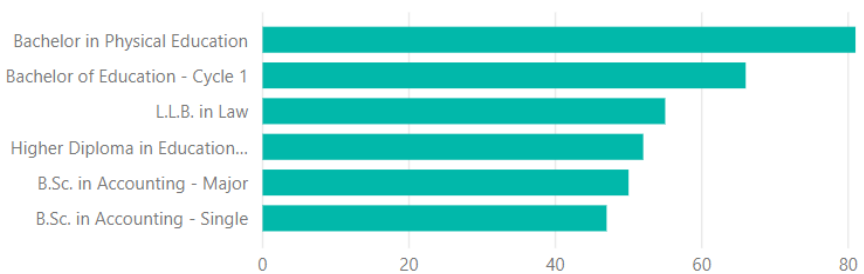
Graduated By College



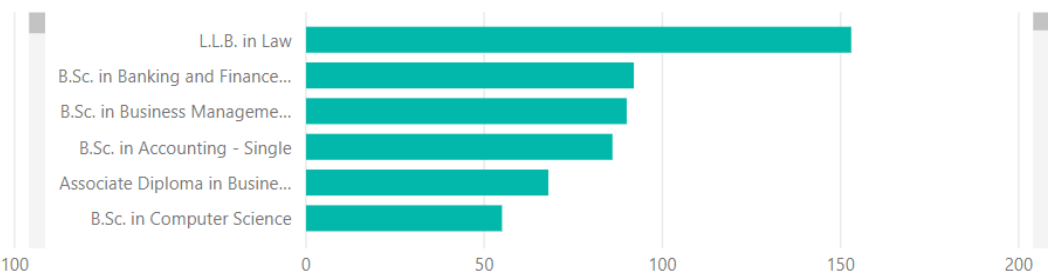
Dismissed By College



Graduated By Program



Dismissed By Program



FILTERS

SMS STATS

SMS STATS 2

SMS GRADES

GRADUATES DASHBOARD

GRADUATES DASHBOARD 2

DISMISSED DASHBOARD

DISMISSED DASHBOARD 2

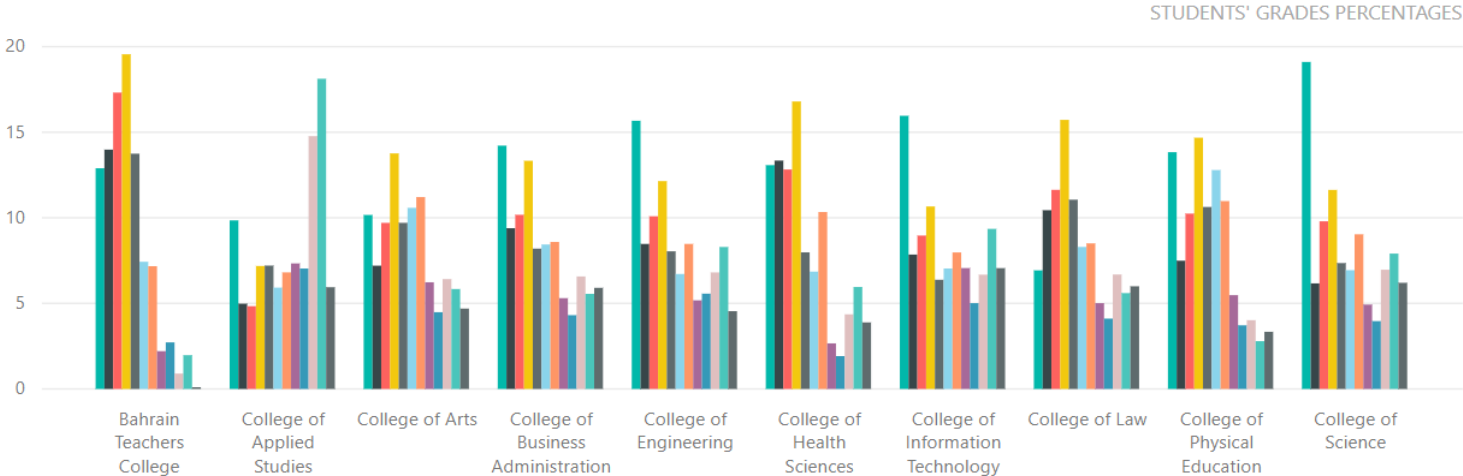
GRADES GRID DASHBOARD

2017 - 2

COLLEGE

- ☐ Bahrain Teachers College
- ☐ College of Applied Studies
- ☐ College of Arts
- ☐ College of Business Administration
- ☐ College of Engineering
- ☐ College of Health Sciences
- ☐ College of Information Technology
- ☐ College of Law
- ☐ College of Physical Education
- ☐ College of Science
- ☐ Unit for Teaching Excellence and Leadership

Average of F PCT by COURSE



		GRADES PERCENTAGES												
COURSE	COURSE_DSC	A PCT	A- PCT	B+ PCT	B PCT	B- PCT	C+ PCT	C PCT	C- PCT	D+ PCT	D PCT	F PCT	W PCT	
ENGL549	LITERATURE AND LANGUAGE TEACHING	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	
MATHS511	ALGEBRA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	
MGTA160	INTERPERSONAL SKILLS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	
PHA209	PHARMACOLOGY & THERAPEUTICS I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	
PICENG461	SPECIAL TOPICS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	
TCDEE583	ASSESSMENT AND EVALUATION IN ENGLISH LANGUA...	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	
CENG517	ADVANCED STEEL DESIGN	25.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	75.00	0.00	
MATHS121	CALCULUS AND ANALYTIC GEOMETRY I	2.20	0.95	0.95	1.89	1.57	1.89	2.83	3.15	2.83	5.03	65.10	11.64	
ETDA161	ELECTRONICS FUNDAMENTALS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.25	6.25	0.00	62.50	25.00	
MEDA121	MECHANICS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.69	7.69	61.54	23.08	
STAT272	INTRODUCTION TO BIOSTATISTICS	8.34	1.67	1.67	3.34	3.34	5.00	1.67	1.67	3.34	6.67	58.34	5.00	
PHYCSA101	GENERAL PHYSICS	10.53	0.00	0.00	15.79	0.00	0.00	5.00	5.00	5.00	5.00	5.00	5.00	
Total		13.35	8.34	10.10	13.04	8.71	8.21	9.00	9.00	9.00	9.00	9.00	9.00	

Back < > Print

FILTERS

GRADUATES DASHBOARD

Cohort

Select All	2011	2013	2015	2017
2010	2012	2014	2016	

College

Select All	College of Applied Studies
Bahrain Teachers College	College of Arts

School

Select All	BA in Arabic	BA in Islamic Studies
(Blank)	BA in Banking an...	COM.

Degree

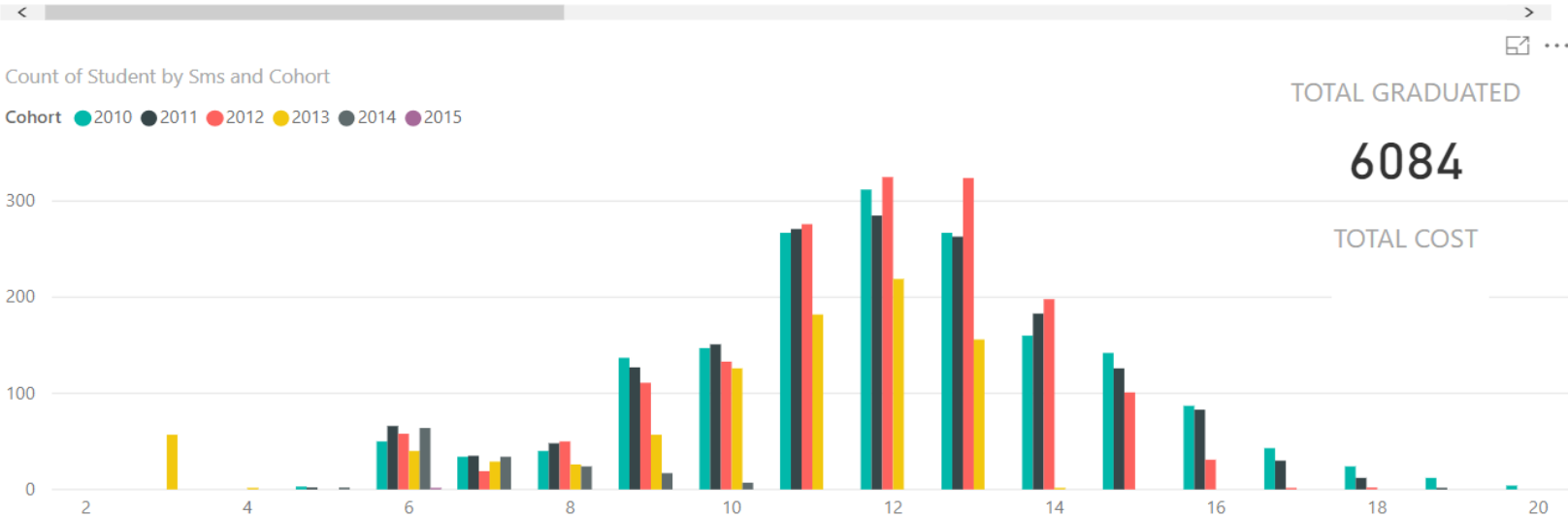
Select All	B.Sc.
Associate Diploma	Diploma

Sms

Select All	0	3	4	5
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Graduates Grid

Sms Cohort	0			3			4			5			6			7			8			9		
	#	%	BD	#	%	BD	#	%	BD	#	%	BD	#	%	BD	#	%	BD	#	%	BD	#	%	
2010	2135	55.25%	28422500							3	0.08%	37500	50	1.29%	750000	34	0.88%	595000	40	1.04%	800000	137	3.5	
2011	1890	52.90%	25552500							2	0.06%	25000	66	1.85%	990000	35	0.98%	612500	48	1.34%	960000	127	3.5	
2012	2625	61.71%	45735000										58	1.36%	870000	19	0.45%	332500	50	1.18%	1000000	111	2.6	
2013	3846	81.14%	82502500	57	1.20%	427500	1	0.02%	10000				40	0.84%	600000	29	0.61%	507500	26	0.55%	520000	57	1.2	
2014	5073	97.17%	102370000							2	0.04%	25000	64	1.23%	960000	34	0.65%	595000	24	0.46%	480000	17	0.3	
2015	5578	99.98%	96142500										1	0.02%	15000									
2016	5798	100.00%	79190000																					
2017	5631	100.00%	44182500																					
Total	32576	84.26%	504097500	57	0.15%	427500	1	0.00%	10000	7	0.02%	87500	279	0.72%	4185000	151	0.39%	2642500	188	0.49%	3760000	449	1.1	



FILTERS

## DISMISSED DASHBOARD

### Cohort

Select All	2011	2013	2015	2017
2010	2012	2014	2016	

### College

Select All	College of Applied Studies
Bahrain Teachers College	College of Arts

### School

Select All	BA in Arabic	BA in Islamic Studies
(Blank)	BA in Banking an...	COM.

### Degree

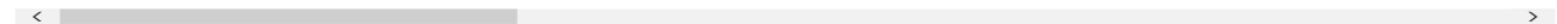
Select All	B.Sc.
Associate Diploma	Diploma

### Sms

Select All	0	1	2	3
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### Dismissed Grid

Sms Cohort	0			1			2			3			4			5			6		
	#	%	BD	#	%	BD	#	%	BD	#	%	BD	#	%	BD	#	%	BD	#	%	B
2010	2384	61.70%	60032500				52	1.35%	260000	70	1.81%	525000	279	7.22%	2790000	491	12.71%	6137500	315	8.15%	
2011	2461	68.88%	60550000	1	0.03%	2500	40	1.12%	200000	57	1.60%	427500	264	7.39%	2640000	358	10.02%	4475000	181	5.07%	
2012	2977	69.98%	76275000	19	0.45%	47500	78	1.83%	390000	102	2.40%	765000	247	5.81%	2470000	294	6.91%	3675000	238	5.59%	
2013	3269	68.97%	86120000	36	0.76%	90000	93	1.96%	465000	74	1.56%	555000	322	6.79%	3220000	347	7.32%	4350000	265	5.59%	
2014	3686	70.60%	86260000	44	0.84%	110000	78	1.49%	390000	194	3.72%	1455000	368	7.05%	3680000	325	6.22%	4062500	250	4.79%	
2015	4134	74.10%	79955000	65	1.17%	162500	99	1.77%	495000	153	2.74%	1147500	349	6.26%	3490000	408	7.31%	5100000	281	5.04%	
2016	4795	82.70%	71942500	31	0.53%	77500	386	6.66%	1930000	296	5.11%	2220000	247	4.26%	2470000	40	0.69%	500000	1	0.02%	
2017	5350	95.01%	43307500	228	4.05%	570000	45	0.80%	225000				8	0.14%	80000						
Total	29056	75.16%	564442500	424	1.10%	1060000	871	2.25%	4355000	946	2.45%	7095000	2084	5.39%	20840000	2263	5.85%	28300000	1531	3.96%	2



### Count of Student by Sms and Cohort

Cohort ● 2010 ● 2011 ● 2012 ● 2013 ● 2014 ● 2015 ● 2016 ● 2017



TOTAL DISMISSED

9604

TOTAL COST

DISMISSED DASHBOARD

SMS STATS

SMS STATS 2

SMS GRADES

GRADUATES DASHBOARD

GRADUATES DASHBOARD 2

DISMISSED DASHBOARD

DISMISSED DASHBOARD 2

# IOT APPLICATIONS IN EDUCATION



# IOT APPLICATIONS IN EDUCATION

4 Jun, 2018 in IOT Tutorials by Data Flair

<https://data-flair.training/blogs/iot-in-education/>

Smart School Transportation



2

Cyber School with IOT 21<sup>st</sup> Century School

Smart School Office

1



Student IoT Project Management



9

Smart School Building Management



3

Smart Student Health



4

Smart Classrooms



5

Smart STEAM Lab



6

Smart Cafeteria/Minimart



7

Student Activity Tracking



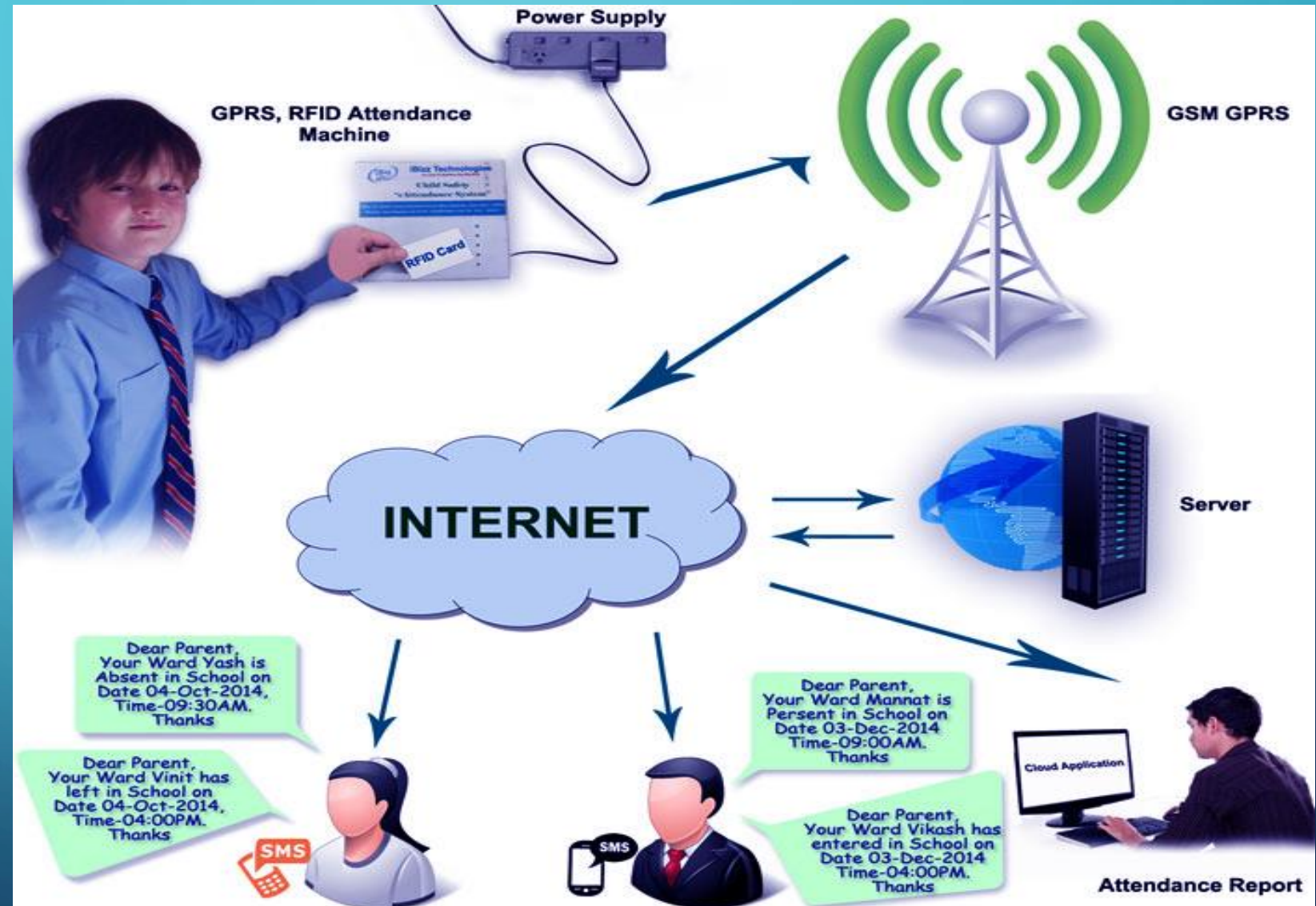
8

# IOT Education Applications

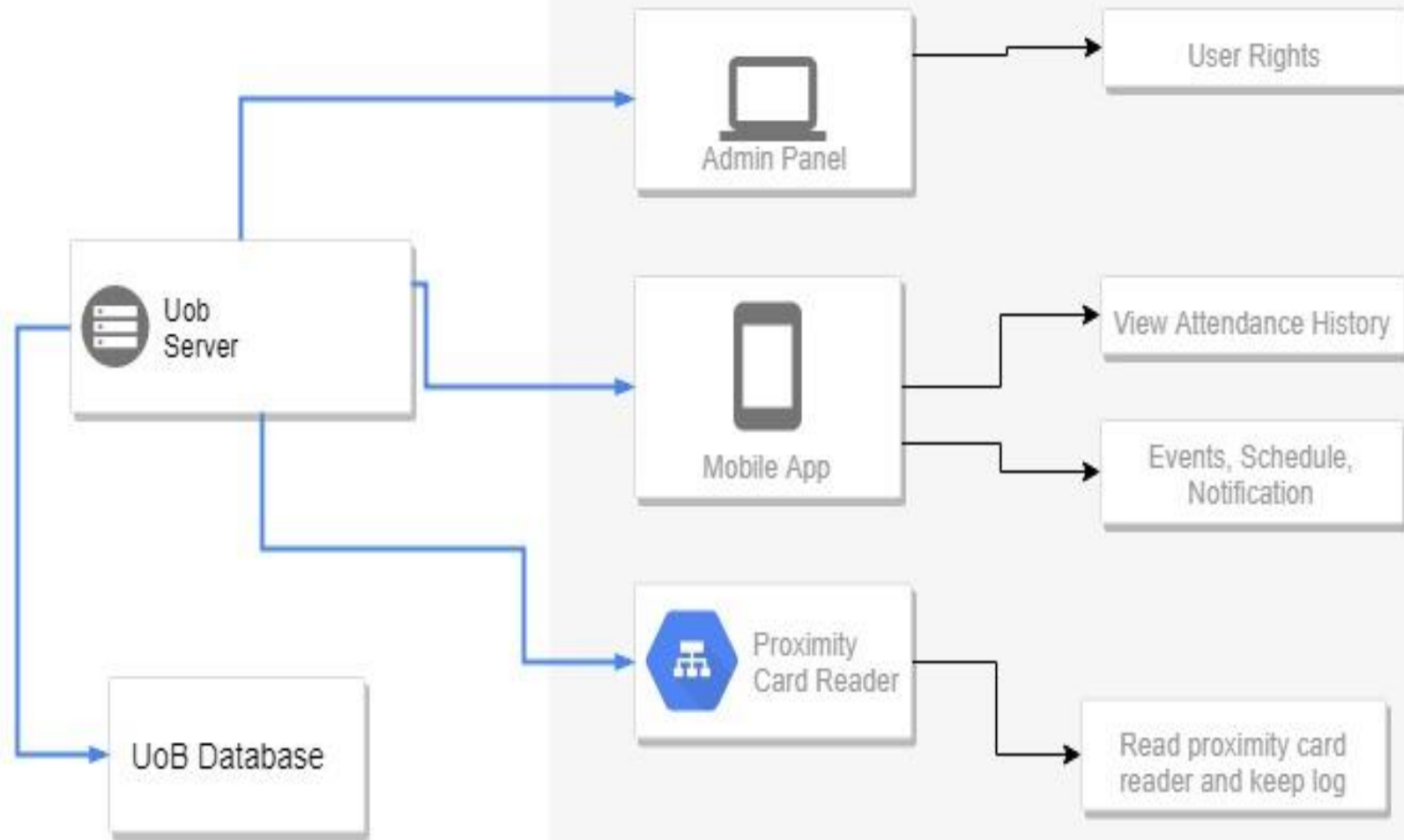




# CASE OF STUDENT ATTENDANCE & IOT



## Architecture of UoB Attendance System





# POSSIBLE SCENARIOS AND BENEFITS

## – 1

**OBJECTIVES: REDUCE FAILURE RATES AND/OR SPEED UP DROPOUTS**

**OPERATIONAL BENEFITS:**

- Reduce attendance logging time and efforts
- Faculty and Students satisfactions
- Accuracy of entered data
- Apply University rule, of “Compulsory Attendance”
- Source of rich data for management decisions



# POSSIBLE SCENARIOS AND BENEFITS

## - 2

### ATTENDANCE COLLECTED DATA ANALYTICAL BENEFITS

#### POSSIBLE SCENARIOS:

- Course type, faculty member,
- Lecture time, lecture day of the week and location
- Pattern of absence by students and year of study
- Pattern of absence by student level (year of study or GPA)
- Pattern of absence during events, periodical tests and University activities
- Etc.

# CONCLUSION

- IoT plays a major role in different activities of Education
- Has a key role in accurate and speedy data collection
- Its important that we make best use of the data collected to enhance management decision making and Improve customer services



**Q & A**

**THANK YOU**