

Computer Programming

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Session: Sorting: Some Motivation



- Basic constructs used to write useful programs
 - Assignment statements
 - Arithmetic and logical expressions
 - Basic input and output
 - Sequential and conditional statements
 - Iteration constructs
 - Functions
 - Arrays and matrices

Overview of This Lecture



- The sorting problem
 - Some motivation
 - Applicability in different contexts



ROLL NUMBER	Q1	Q2	Q 3	Total
14010101	9	8	7	24
14020202	9	6	3	18
14030201	6	5	6	17
14020103	9	8	8	25
14001122	10	8	9	27
14020202	7	8	9	24

- Rank all students in decreasing order of "Total" marks
- Find the "n" top scoring students in Quiz 1
- Find the "n" least scoring students in Quiz 3



ROLL NUMBER	Q1	Q2	Q3	Total
14010101	9	8	7	<mark>3</mark> 24
14020202	9	6	3	<mark>4</mark> 18
14030201	6	5	6	5 ¹⁷
14020103	9	8	8	2 ²⁵
14001122	10	8	9	1 27
14020202	7	8	9	<mark>3</mark> 24

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ROLL NUMBER	Q1	Q2	Q3	Total	• Rank all students in decreasing
14001122	10	8	9	1 ²⁷	order of "Total" marks
14020103	9	8	8	2 ²⁵	• Find the "n" top scoring students
14010101	9	8	7	3 ²⁴	in Qu Which entry appears
14020202	7	8	9	<mark>3</mark> 24	topmost among equals? Rank by Roll Numbers?
14020202	9	6	3	4 ¹⁸	students in Quiz 3
14030201	6	5	6	5 ¹⁷	



	ROLL NUMBER	Q1	Q2	Q3	Total	 Rank all students in decreasing
	14001122	10	8	9	27	order of "Total" marks
(14020103 <mark>2</mark>	9	8	8	25	• Find the "n" top scoring students
	14010101 2	9	8	7	24	in Quiz 1
	14020202	9	6	3	18	M/high antra anna ann tanna act
	14020202	7	8	9	24	st among equals?
	14030201 4	6	5	6	17	Rank by "Total" marks?





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Some Observations







• Want to purchase an airline ticket from Mumbai to New Delhi for December 25, 2014

List of options on any online ticketing portal sorted by

Allows user to look at the top few options for a given criterion, since these are likely to be most interesting

Sorting criteria could vary: What is more useful for one may be less useful for another





- Contains (name, telephoneNumber) pairs for individuals
- What if we store them in an arbitrary order?

Subodh Das	9123456780
Alex John	8923456701
Shiva Iyer	8899776655
Anjali Singh	9829019288
Anjali Verma	8819190910



 How do we find the telephone numbers of Shiva Iyer and Anjali Verma?

Phone Directory



 What if names were sorted alphabetically (as in a dictionary) by first name and then by last name?

Alex John 8923456701

Anjali Singh 9829019288

Anjali Verma 8819190910

... Shiva Iyer 8899776655

•••

. . .

Subodh Das 9123456780

Much easier to find a given name:

Searching becomes easier on sorted data





- Sorting as a natural computational task
 - Several real-life contexts
- Sorting can help searching

Sorting and Searching: Two Fundamental Problems in Computing