Microsoft SQL Server 2019
Design & Develop

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حساب و کتاب یه بقالی

Factor Header		
Date *	Customer Code *	Factor Number *U
1398-01-01	11	1
1398-01-02	2	2

		Customer	
Birth Date	Sex	Customer Name *	Customer Code *U
تاریخ	؟	متن	عدد
		Ali	1
		Ahmad	2

Factor Detail					
Total Price *	Quantity *	Unit Price *	Product Code *	Row Number *U1	Factor Number *U1
2000	2	1000	1	1	1
15000	3	5000	2	2	1
8000	2	4000	3	3	1
20000	4	5000	1	1	2
20000	4	5000	5	2	2
20000	4	5000	6	3	2

Product	
Product Name *	Product Code *U
Snack	1
Chips	2
Coca	3
7UP	4
Pepsi	5
Fanta	6

Data Type

- عددی
- کاراکتری
- تاریخی

Data Type

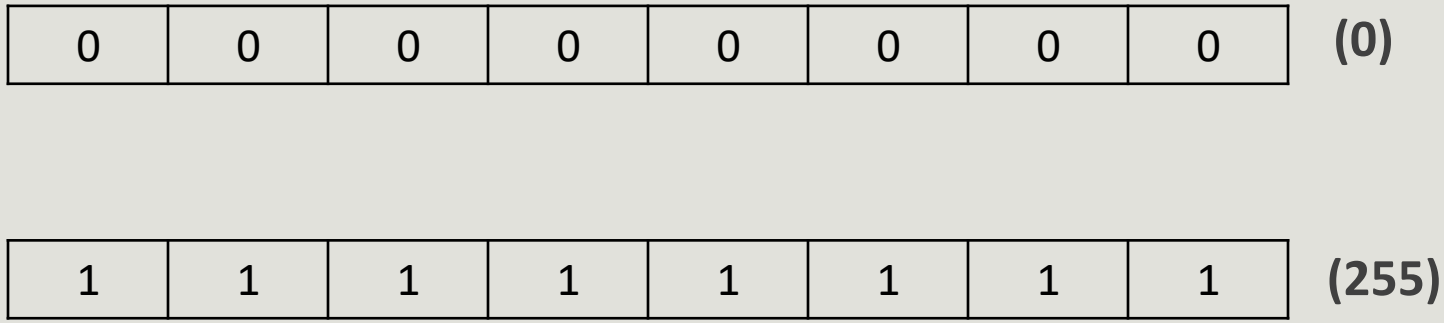
- عددی
  - صحیح
  - اعشاری

Data Type

- عددی
  - صحیح
    - TINY INT
    - SMALL INT
    - INT
    - BIG INT

Data Type – Tiny Int

1 Byte = 8 bit



Data Type – Small Int

Sign	0-1	0-1	0-1	0-1	0-1	0-1	0-1
0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1

- **2 Byte = 16 bit (1 Sign bit + 15 Data bit)**
- **-2^15 ~ (2^15) – 1**
- **-32,768 ~ 32,767**

Data Type – Int

Sign	0-1	0-1	0-1	0-1	0-1	0-1	0-1
0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1

- **4 Byte = 32 bit (1 Sign bit + 31 Data bit)**
- **-2^31 ~ (2^31) – 1**
- **-2,147,283,648 ~ 2,147,283,647**

Data Type – Big Int

Sign	0-1	0-1	0-1	0-1	0-1	0-1	0-1
0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1

- **8 Byte = 64 bit (1 Sign bit + 63 Data bit)**
- **-2^63 ~ (2^63) – 1**
- **-9,223,372,036,854,775,808 ~ 9,223,372,036,854,775,807**

Data Type

- عددی
  - صحیح
  - اعشاری
    - Exact
    - Approximate

Data Type

- عددی
  - صحیح
  - اعشاری
    - Exact
    - Decimal
    - Numeric

Data Type – Decimal & Numeric

- **decimal**[(*p*[,*s*])]
- **numeric**[(*p*[,*s*])]
  - Fixed **P**recision
  - **S**cale Numbers

- (-10^38) + 1 ~ (10^38) – 1
- 1 <= p <= 38
- 0 <= s <= p
- The default precision is 18

Data Type – Decimal & Numeric

- decimal(5,2)
  - 12345
  - 123456
  - 12345.6 (12345)
  - 1234.5
  - 123.45
  - 12.345 (12.34)
  - 1.2345 (1.23)

Data Type – Decimal & Numeric

Precision	Storage bytes
1 ~ 9	5
10 ~ 19	9
20 ~ 28	13
29 ~ 38	17

- تفاوت Decimal و Numeric

Data Type

- عددی
  - صحیح
  - اعشاری
    - Exact
    - Approximate
    - Float
    - Real

Data Type - Float

n value	Precision	Storage size
1-24	7 digits	4 Bytes
25-53	15 digits	8 Bytes

- float [(n)]
- Number of bits to store the mantissa in scientific notation
  - 2,350,000 = 2.35 * 10^6
  - 0.000,875,4 = 8.754*10^-4

Data Type - Real

- float(24)
- 4 Bytes

Data Type

- کاراکتری
  - CHAR
  - NCHAR
  - VARCHAR
  - NVARCHAR

Data Type - Char

- 1 Character
  - 1 Byte = 8 bit
- 1 Byte
  - 8 bit
  - 2^8 = 256
- CHAR(n)
  - 1<= n <= 8000
  - 1 is Default
  - 8000 = MAX
    - 2 GB

Data Type - Char

0	<NUL>	32	<SPC>	64	@	96	`	128	Ä	160	†	192	¿	224	‡
1	<SOH>	33	!	65	A	97	a	129	Å	161	°	193	¡	225	·
2	<STX>	34	"	66	B	98	b	130	Ç	162	¢	194	¬	226	‚
3	<ETX>	35	#	67	C	99	c	131	É	163	£	195	√	227	„
4	<EOT>	36	$	68	D	100	d	132	Ñ	164	§	196	ƒ	228	‰
5	<ENQ>	37	%	69	E	101	e	133	Ö	165	•	197	≈	229	Â
6	<ACK>	38	&	70	F	102	f	134	Ü	166	¶	198	Δ	230	Ê
7	<BEL>	39	'	71	G	103	g	135	á	167	ß	199	«	231	Á
8	<BS>	40	(	72	H	104	h	136	à	168	®	200	»	232	Ë
9	<TAB>	41	)	73	I	105	i	137	â	169	©	201	…	233	È
10	<LF>	42	*	74	J	106	j	138	ä	170	™	202		234	Í
11	<VT>	43	+	75	K	107	k	139	ã	171	´	203	À	235	Î
12	<FF>	44	,	76	L	108	l	140	å	172	¨	204	Ã	236	Ï
13	<CR>	45	-	77	M	109	m	141	ç	173	≠	205	Õ	237	Ì
14	<SO>	46	.	78	N	110	n	142	é	174	Æ	206	Œ	238	Ó
15	<SI>	47	/	79	O	111	o	143	è	175	Ø	207	œ	239	Ô
16	<DLE>	48	0	80	P	112	p	144	ê	176	∞	208	–	240	
17	<DC1>	49	1	81	Q	113	q	145	ë	177	±	209	—	241	Ò
18	<DC2>	50	2	82	R	114	r	146	í	178	≤	210	"	242	Ú
19	<DC3>	51	3	83	S	115	s	147	ì	179	≥	211	"	243	Û
20	<DC4>	52	4	84	T	116	t	148	î	180	¥	212	'	244	Ù
21	<NAK>	53	5	85	U	117	u	149	ï	181	µ	213	'	245	ı
22	<SYN	54	6	86	V	118	v	150	ñ	182	∂	214	÷	246	ˆ
23	<ETB>	55	7	87	W	119	w	151	ó	183	Σ	215	◊	247	˜
24	<CAN>	56	8	88	X	120	x	152	ò	184	∏	216	ÿ	248	¯
25	<EM>	57	9	89	Y	121	y	153	ô	185	π	217	Ÿ	249	˘
26	<SUB>	58	:	90	Z	122	z	154	ö	186	∫	218	⁄	250	˙
27	<ESC>	59	;	91	[	123	{	155	õ	187	ª	219	€	251	°
28	<FS>	60	<	92	\	124	|	156	ú	188	º	220	‹	252	¸
29	<GS>	61	=	93	]	125	}	157	ù	189	Ω	221	›	253	˝
30	<RS>	62	>	94	^	126	~	158	û	190	æ	222	fi	254	˛
31	<US>	63	?	95	_	127	<DEL>	159	ü	191	ø	223	fl	255	ˇ

- Code Page
- COLLATION

Data Type - Char

A	L	I					

CHAR(16)

- ALI
- 16 Byte

Data Type - NChar

- 1 Character
  - 2 Byte = 16 bit

2 Byte
  - 16 bit
  - 2^16 = 65,536

NCHAR(n)
  - 1<= n <= 4000
  - 1 is Default
  - 4000 = MAX
    - 2 GB

Data Type - NChar

A	L	I					

NCHAR(16)

- ALI
- 32 Byte

Data Type - VarChar

- 1 Character
  - 1 Byte = 8 bit

VARCHAR(n)

  - 1<= n <= 8000
  - 1 is Default
  - 8000 = MAX
    - 2 GB

Data Type - VarChar

A	L	I

VarCHAR(16)

- ALI
- 3 Byte

Data Type - NVarChar

- 1 Character
  - 2 Byte = 16 bit

NVARCHAR(n)

- 1<= n <= 4000
- 1 is Default
- 4000 = MAX
  - 2 GB

Data Type - NVarChar

A	L	I

NVARCHAR(16)

- ALI
- 6 Byte

Data Type

Title	Fix/Variable	Size	MAX
CHAR	Fix	1 Byte	8000
VARCHAR	Variable	1 Byte	8000
NCHAR	Fix	2 Byte	4000
NVARCHAR	Variable	2 Byte	4000

کدام نوع بهتر است؟

Data Type

- عددی
- کاراکتری
- تاریخی
  - Date
  - DateTime
  - DateTime2
  - SmallDateTime
  - Time

Data Type – Date & Time

Data Type	From	To	Size	Accuracy
Date	01/01/01	9999/12/31	3 Bytes	1 Day
DateTime	1753/01/01	9999/12/31	8 bytes	.000 .003 .007
DateTime2	01/01/01	9999/12/31	9 Bytes	100 ns

Data Integrity

- Unique
  - Search
- Reference
  - Search

Data Search

- Not Sorted Data
- Sorted Data

Data Search

Data Integrity

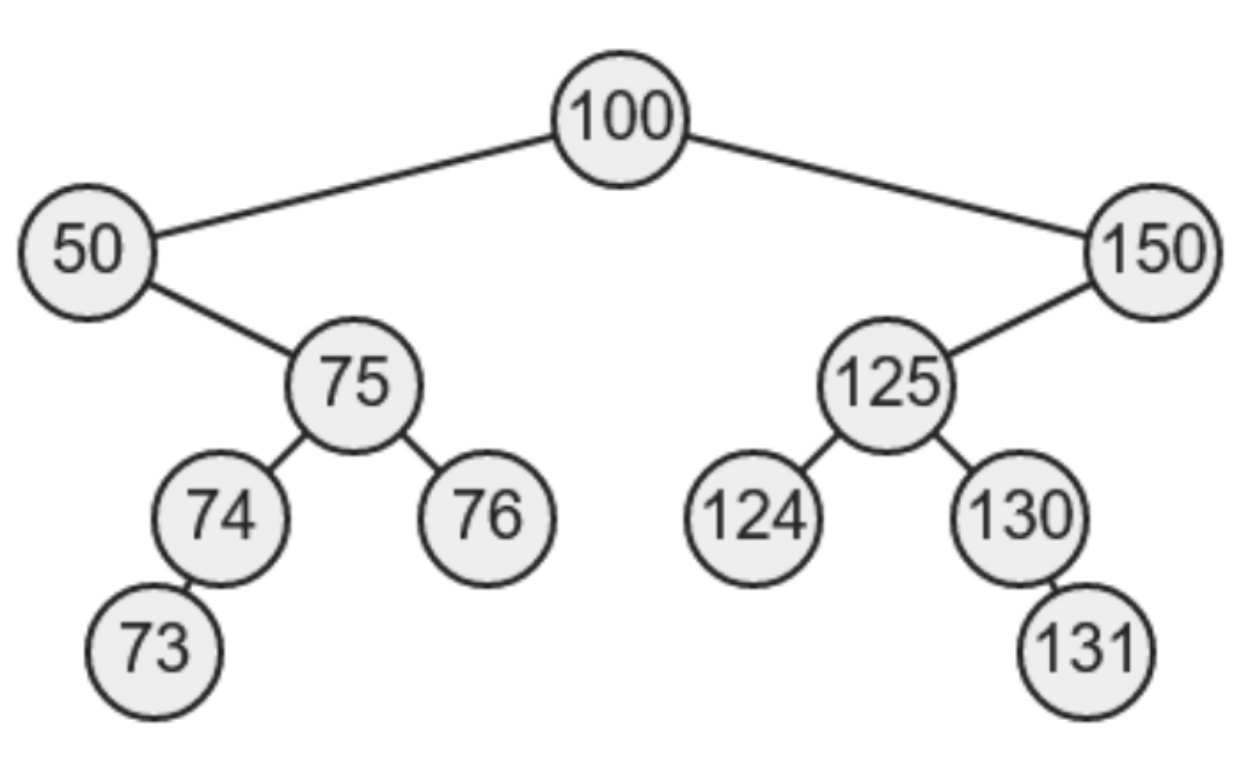
- Unique
  - Search => Index
- Reference
  - Search => Index

Index

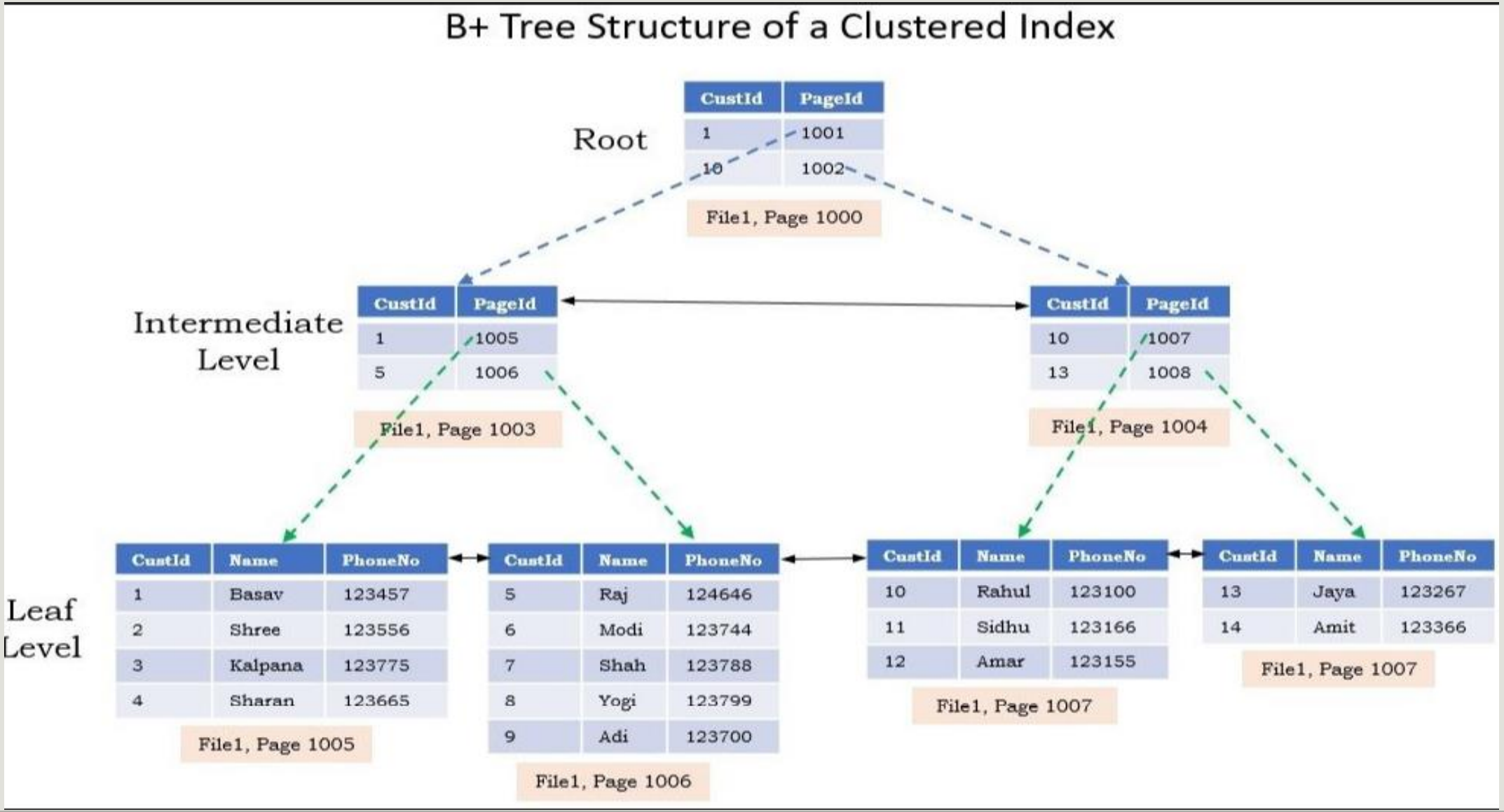
- Clustered
- Non Clustered
- Column Store

Index - Clustered

Index - Clustered



Index - Clustered



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1	Hasan					
2	Ali					
3	Ahmad					
4	Ali					
5	Hasan					
6	Ahmad					
7	Hosein					

IDs	FirstName
3, 6	Ahmad
2, 4	Ali
1, 5	Hasan
7	Hosein