

Algoritmos e Estruturas de Dados III

5 - Correção de exercícios

Prof. Hayala Curto
2022

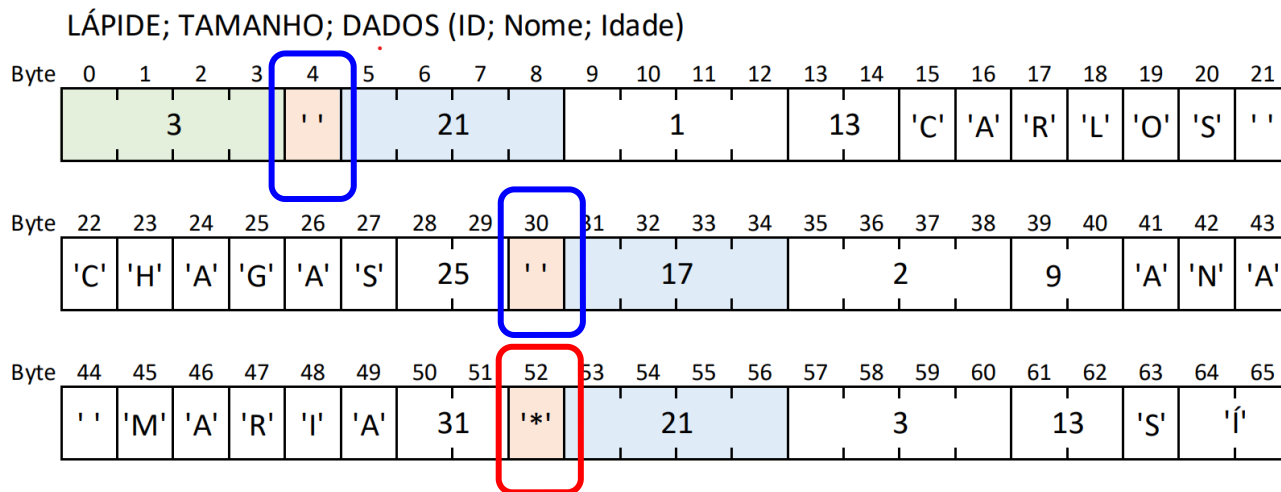


Exercício 1

Para que servem os campos lápide em um arquivo?

Exercício 1

- Lápide
 - Marca de exclusão
 - Campo (1 byte) que indica se o registro foi excluído ou permanece válido
 - Os registros só são realmente apagados do arquivo quando há uma reordenação



Exercício 2

Os dados de cliente de um determinado projeto devem incluir a possibilidade de armazenamento de um número variável de emails. Porém, o email não é um campo obrigatório e não será usado para buscas. EXPLIQUE como deve ser o campo para armazenamento desses emails no arquivo.

Entidade:

```
Cliente {  
  short ID;  
  String nome;  
  String[] emails;  
}
```

Registro:

ID	→ short de 2 bytes
nome	→ string UTF-8 com indicador de tamanho
emails.length	→ byte para indicar quantidade de emails
emails[0]	→ string UTF-8 com indicador de tamanho
emails[1]	→ string UTF-8 com indicador de tamanho
...	
emails[n-1]	→ string UTF-8 com indicador de tamanho

Indicador de quantidade

ID; NOME; EMAILS

Byte	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
		1			7		'R'	'O'	'N'	'A'	'L'	'D'	'O'	3	17	'r'	'o'	'n'	'a'	'l'	'd'	'o'	'@'	'g'	'm'	'a'	'i'	'l'	'.'	

Byte	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59
	'c'	'o'	'm'	19	'r'	'o'	'n'	'a'	'l'	'd'	'o'	'@'	'p'	'u'	'c'	'm'	'i'	'n'	'a'	's'	'.'	'b'	'r'	18	'r'	'o'	'n'	'n'		

Byte	60	61	62	63	64	65	66	67	68	69	70	71	72	73
	'y'	'@'	'y'	'a'	'h'	'o'	'o'	'.'	'c'	'o'	'm'	'.'	'b'	'r'

Exercício 3

Um arquivo binário é apenas uma sequência de bytes. Dessa forma, quaisquer valores a serem armazenados em um arquivo também devem ser representados como sequências de bytes. Considerando isso, considere seguinte contexto em que um sistema para controle de banco deseja armazenar os seguintes dados de seus clientes:

- id
- Nome
- CPF
- Data de nascimento
- Renda mensal
- Emails
- Telefones

EXPLIQUE quais seriam as melhores escolhas para organizar os campos desse arquivo de dados e mostre como ficaria após algumas inclusões.

Exercício 3

Um arquivo binário é apenas uma sequência de bytes. Dessa forma, quaisquer valores a serem armazenados em um arquivo também devem ser representados como sequências de bytes. Considerando isso, considere seguinte contexto em que um sistema para controle de banco deseja armazenar os seguintes dados de seus clientes:

- id (**int**)
- Nome (**String de tamanho variável**)
- CPF (**String de tamanho fixo 11**)
- Data de nascimento (**int representando dias a partir de uma data marco**)
- Renda mensal (**float**)
- Emails (**Strings de tamanho variável, com indicador de quantidade e indicador de tamanho de cada string**)
- Telefones (**Strings de tamanho fixo 11, com indicador de quantidade e indicador de tamanho de cada string**)

EXPLIQUE quais seriam as melhores escolhas para organizar os campos desse arquivo de dados e mostre como ficaria após algumas inclusões.

Exercício 3

Inserindo:

Lucas, 112.111.222-30, 22/07/2000, 2090.22, lucas@gmail.com, luquinha@gmail.com, 31 9 88111920

00	00	00	01	00	00	00	01	00	05	L	u	c	a	s	1	1	2	1	1
1	2	2	2	3	0									2	00	0f	l	u	c
a	s	@	g	m	a	i	l	.	c	o	m	00	12	l	u	q	u	i	n
h	a	@	g	m	a	i	l	.	c	o	m	1	3	1	9	8	8	1	1
1	9	2	0	...															

Exercício 4

Considerando a capacidade de ordenação em memória de 3 registros (usando heap como estrutura para ajudar na ordenação), FAÇA:

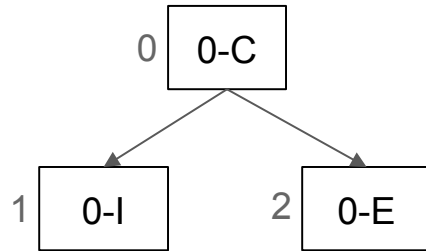
- A intercalação balanceada de 3 caminhos para os registros usando blocos de tamanho variável
- A intercalação polifásica de 3 caminhos.

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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0	1	2
0-C	0-I	0-E



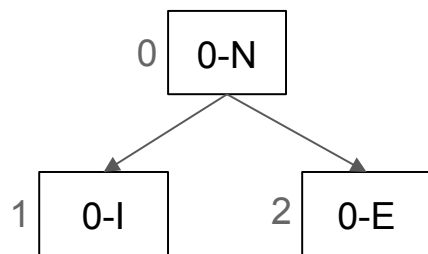
Arq 1:

Arq 2:

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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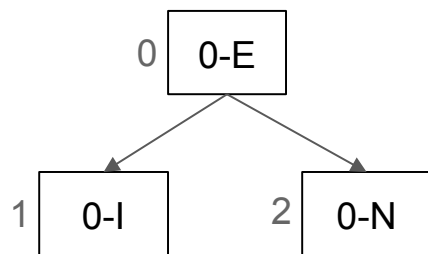
Arq 1: C

Arq 2:

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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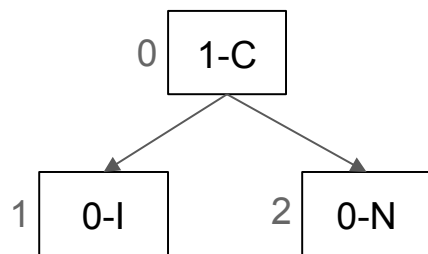
Arq 1: C

Arq 2:

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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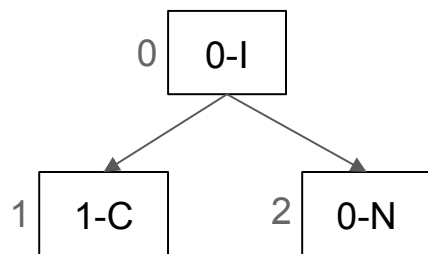
Arq 1: C E

Arq 2:

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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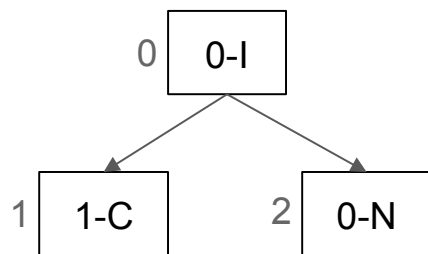
Arq 1: C E

Arq 2:

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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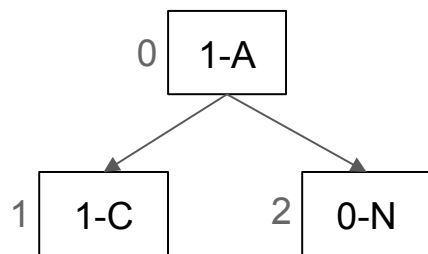
Arq 1: C E I

Arq 2:

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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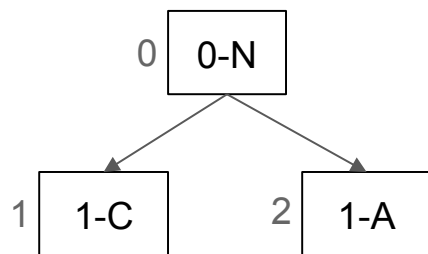
Arq 1: C E I I

Arq 2:

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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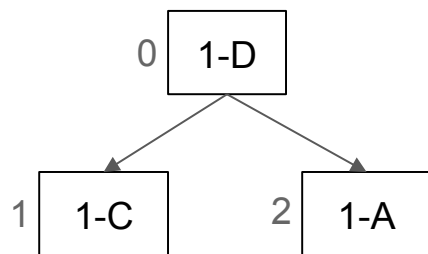
Arq 1: C E I I

Arq 2:

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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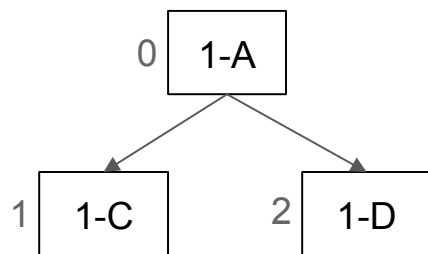
Arq 1: C E I I N

Arq 2:

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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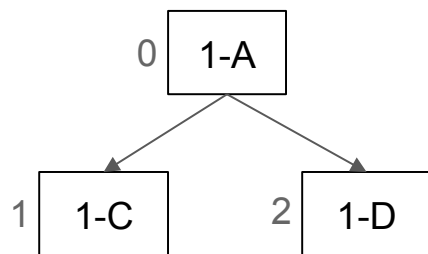
Arq 1: C E I I N

Arq 2:

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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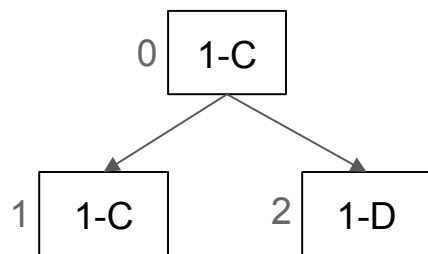
Arq 1: C E I I N

Arq 2: A

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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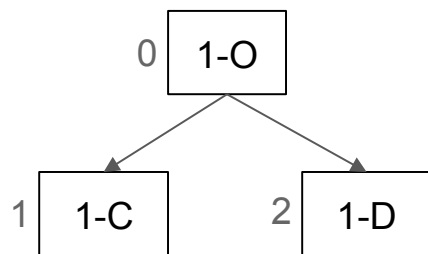
Arq 1: C E I I N

Arq 2: A A

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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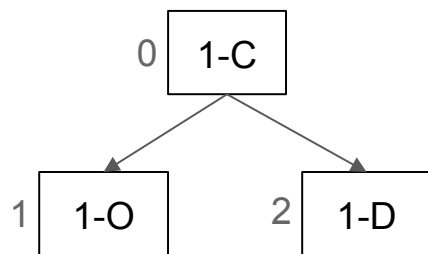
Arq 1: C E I I N

Arq 2: A A C

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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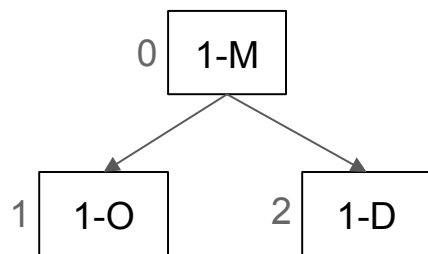
Arq 1: C E I I N

Arq 2: A A C

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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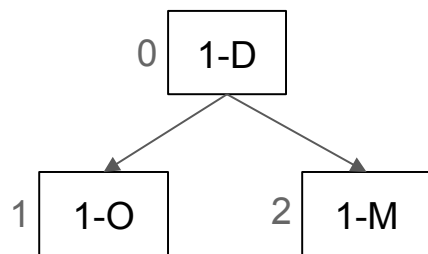
Arq 1: C E I I N

Arq 2: A A C C

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

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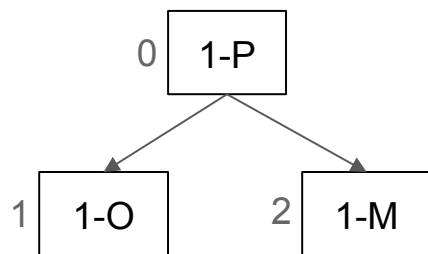
Arq 1: C E I I N

Arq 2: A A C C

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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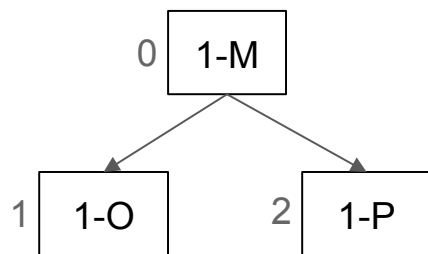
Arq 1: C E I I N

Arq 2: A A C C D

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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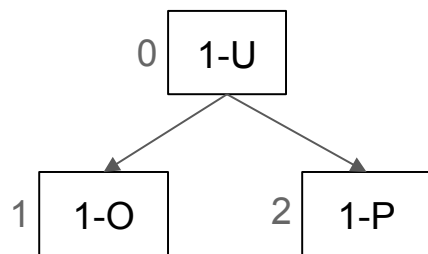
Arq 1: C E I I N

Arq 2: A A C C D

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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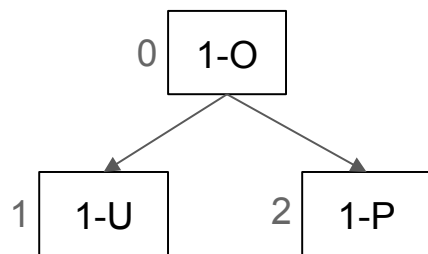
Arq 1: C E I I N

Arq 2: A A C C D M

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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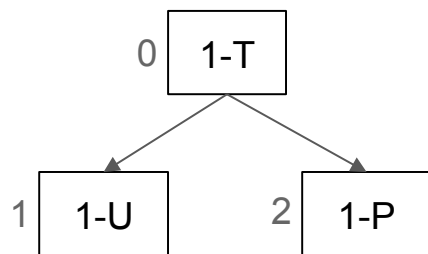
Arq 1: C E I I N

Arq 2: A A C C D M

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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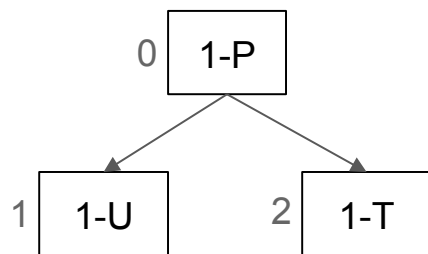
Arq 1: C E I I N

Arq 2: A A C C D M O

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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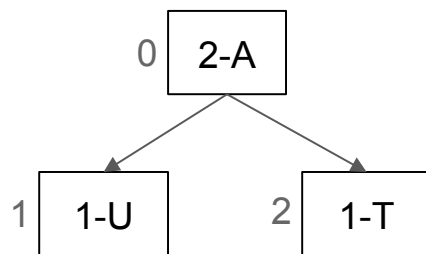
Arq 1: C E I I N

Arq 2: A A C C D M O

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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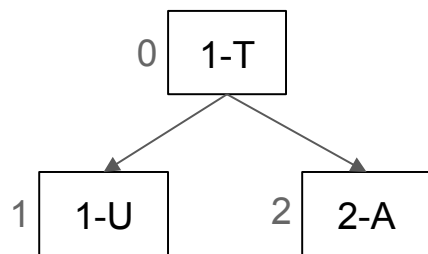
Arq 1: C E I I N

Arq 2: A A C C D M O P

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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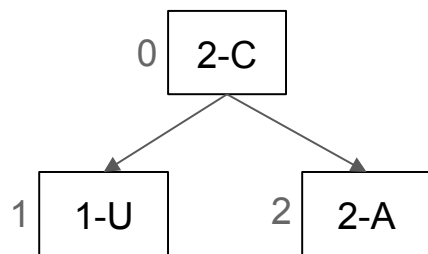
Arq 1: C E I I N

Arq 2: A A C C D M O P

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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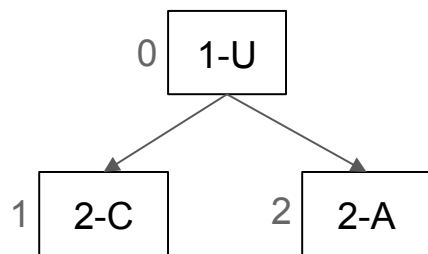
Arq 1: C E I I N

Arq 2: A A C C D M O P T

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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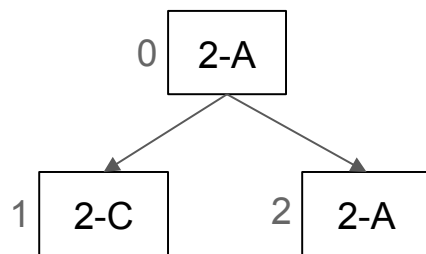
Arq 1: C E I I N

Arq 2: A A C C D M O P T

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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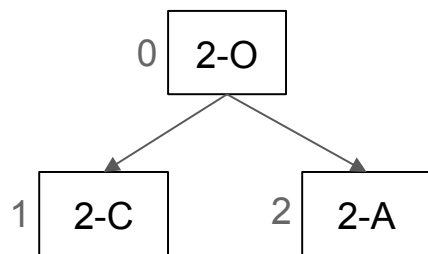
Arq 1: C E I I N

Arq 2: A A C C D M O P T U

Arq 3:

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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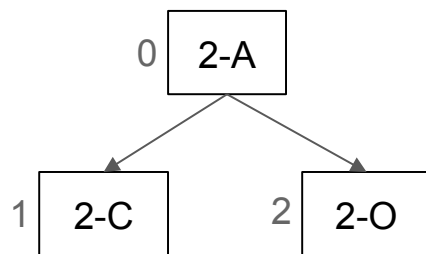
Arq 1: C E I I N

Arq 2: A A C C D M O P T U

Arq 3: A

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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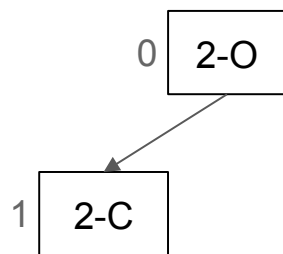
Arq 1: C E I I N

Arq 2: A A C C D M O P T U

Arq 3: A

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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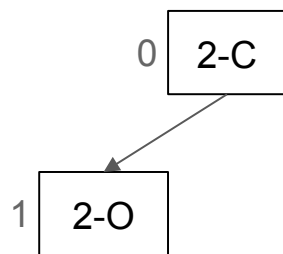
Arq 1: C E I I N

Arq 2: A A C C D M O P T U

Arq 3: A A

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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Arq 1: C E I I N

Arq 2: A A C C D M O P T U

Arq 3: A A

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
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0

2-O

Arq 1: C E I I N

Arq 2: A A C C D M O P T U

Arq 3: A A C

Exercício 4 - intercalação balanceada de 3 caminhos

C	I	E	N	C	I	A	D	A	C	O	M	P	U	T	A	C	A	O
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Arq 1: C E I I N

Arq 2: A A C C D M O P T U

Arq 3: A A C O

Exercício 4 - intercalação balanceada de 3 caminhos

Arq 1: C E I I N

Arq 2: A A C C D M O P T U

Arq 3: A A C O

Exercício 4 - intercalação balanceada de 3 caminhos

Arq 1: C E I I N

Arq 2: A A C C D M O P T U

Arq 3: A A C O

Exercício 4 - intercalação balanceada de 3 caminhos

Arq 1: C E I I N

Arq 2: A A C C D M O P T U

Arq 3: A A C O

Arq 4: A A A A C C C C D E I I M N O O P T U

Arq 5:

Arq 6:

Exercício 4 - intercalação polifásica de 3 caminhos

Arq 1: C E I I N A A C C D M O P T U

Arq 2: A A C O

Arq 3:

**Usei o heap para criar
quantidade diferentes de
blocos em 2 arquivos**

Exercício 4 - intercalação polifásica de 3 caminhos

Arq 1: **C E I I N** A A C C D M O P T U

Arq 2: **A A C O**

Arq 3:

Exercício 4 - intercalação polifásica de 3 caminhos

Arq 1: A A C C D M O P T U

Arq 2:

Arq 3: A A C C E I I N O

Exercício 4 - intercalação polifásica de 3 caminhos

Arq 1: AACCDMPTU

Arq 2:

Arq 3: AACCEIINO

Exercício 4 - intercalação polifásica de 3 caminhos

Arq 1: AACCDMPTU

Arq 2:

Arq 3: AACCEINO

Exercício 4 - intercalação polifásica de 3 caminhos

Arq 1:

Arq 2: AAAACCCCEIIMNOOPTU

Arq 3:

Exercício 5

Criar uma árvore B de ordem 5 e acrescentar a ela, nesta ordem, as seguintes chaves: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, 25, 40, 33. Em seguida, remover, nesta ordem, as seguintes chaves: 20, 3, 5.

- Mostre o arquivo resultante
- Faça o mesmo para uma árvore B+

Exercício 5

Inserindo: **10**, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, 25, 40, 33

10 * * *

Exercício 5

Inserindo: 10, **3**, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, 25, 40, 33

*3*10* * *

Exercício 5

Inserindo: 10, 3, **20**, 8, 15, 1, 9, 2, 4, 5, 30, 18, 25, 40, 33

*3*10*20* *

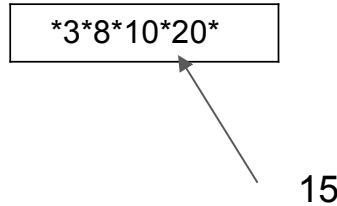
Exercício 5

Inserindo: 10, 3, 20, **8**, 15, 1, 9, 2, 4, 5, 30, 18, 25, 40, 33

*3*8*10*20*

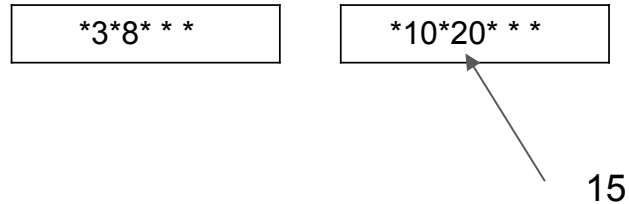
Exercício 5

Inserindo: 10, 3, 20, 8, **15**, 1, 9, 2, 4, 5, 30, 18, 25, 40, 33



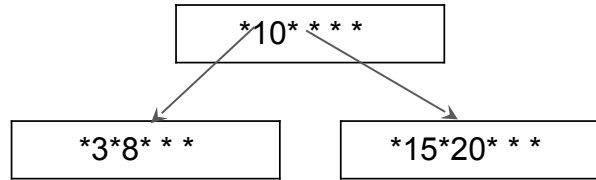
Exercício 5

Inserindo: 10, 3, 20, 8, **15**, 1, 9, 2, 4, 5, 30, 18, 25, 40, 33



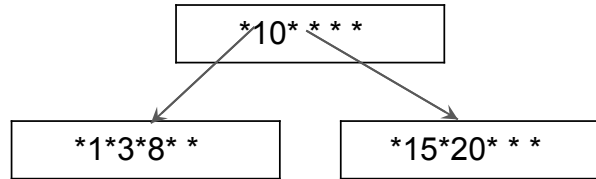
Exercício 5

Inserindo: 10, 3, 20, 8, **15**, 1, 9, 2, 4, 5, 30, 18, 25, 40, 33



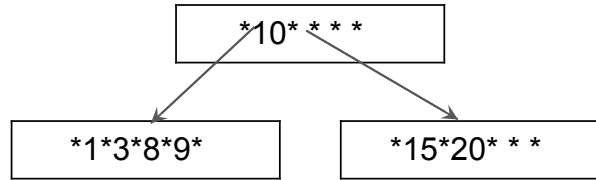
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, 25, 40, 33



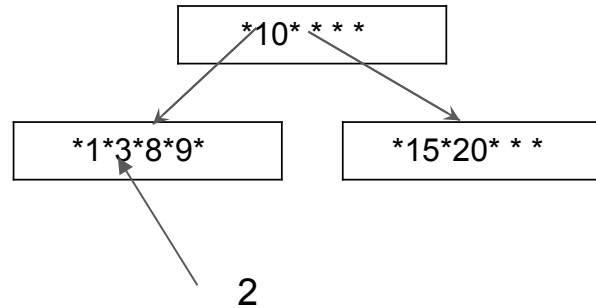
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, **9**, 2, 4, 5, 30, 18, 25, 40, 33



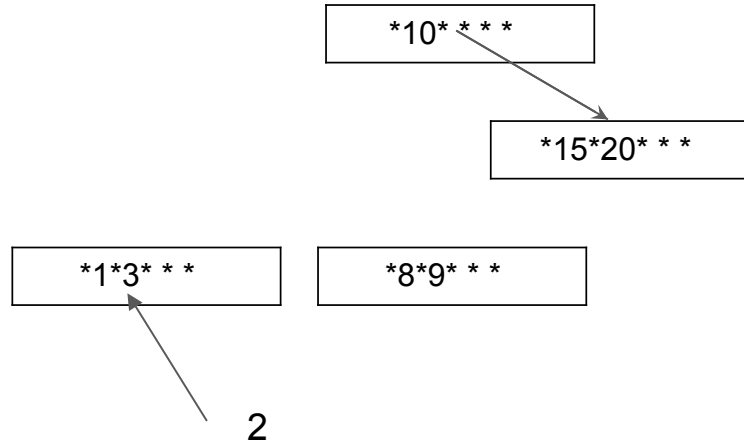
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, **2**, 4, 5, 30, 18, 25, 40, 33



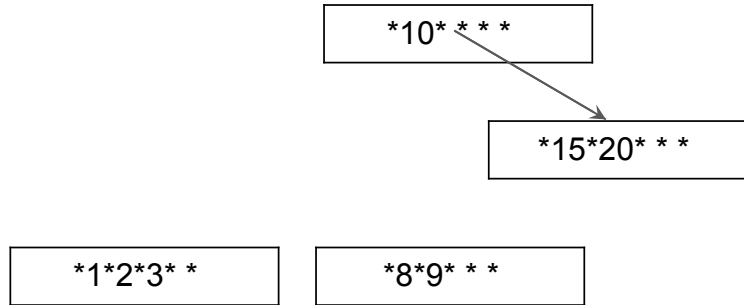
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, **2**, 4, 5, 30, 18, 25, 40, 33



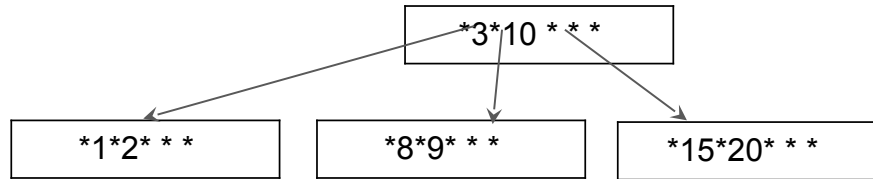
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, **2**, 4, 5, 30, 18, 25, 40, 33



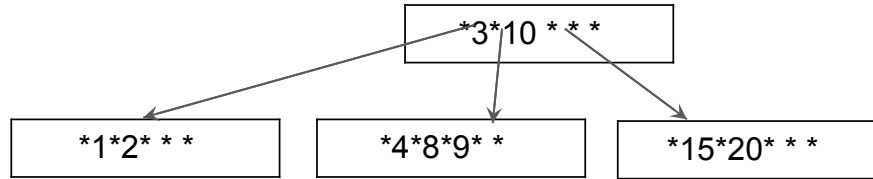
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, **2**, 4, 5, 30, 18, 25, 40, 33



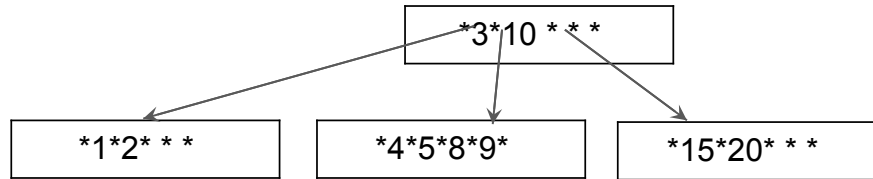
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, **4**, 5, 30, 18, 25, 40, 33



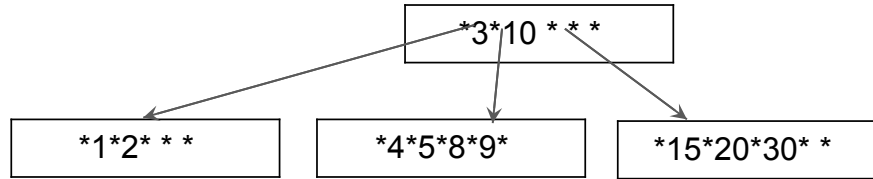
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, **5**, 30, 18, 25, 40, 33



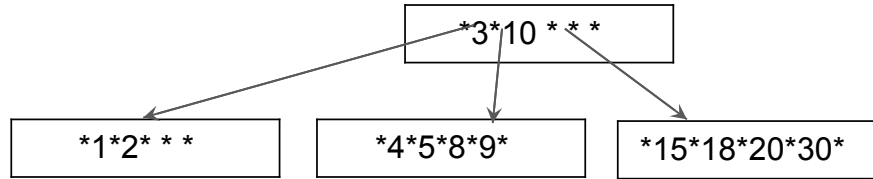
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, **30**, 18, 25, 40, 33



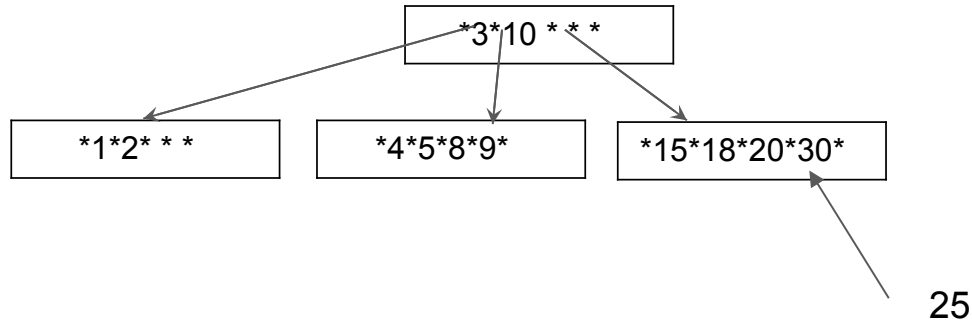
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, **18**, 25, 40, 33



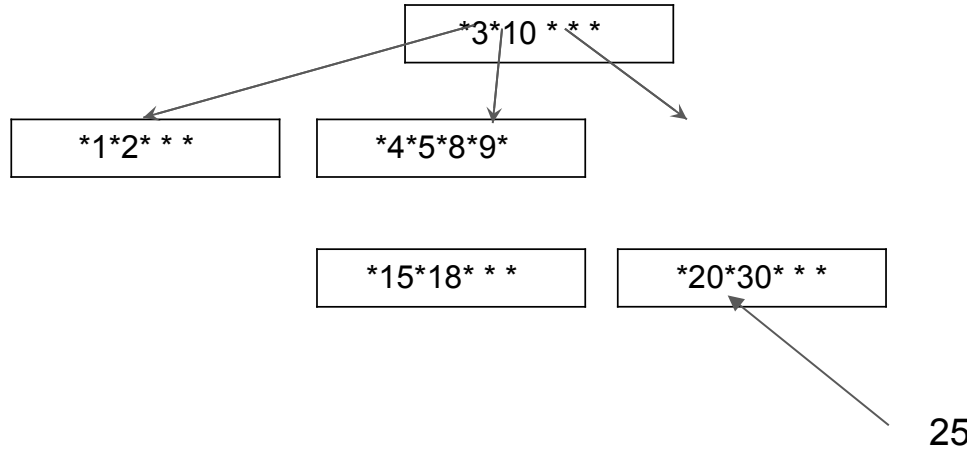
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, **25**, 40, 33



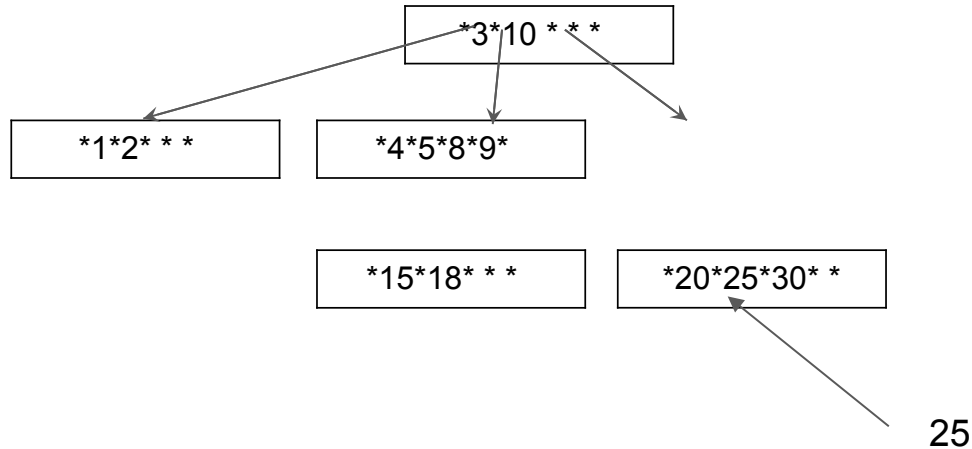
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, **25**, 40, 33



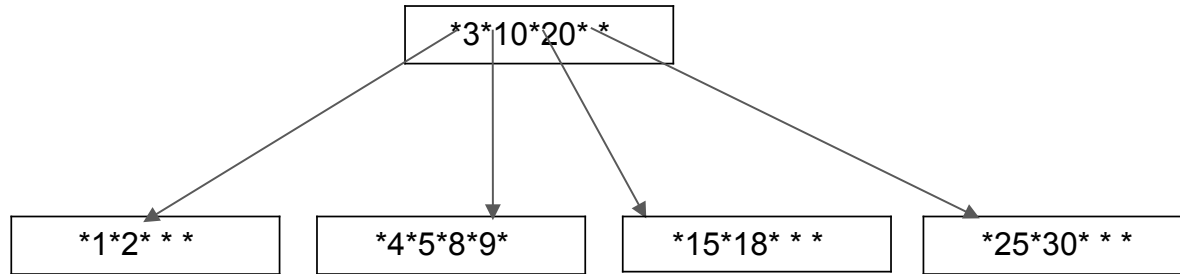
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, **25**, 40, 33



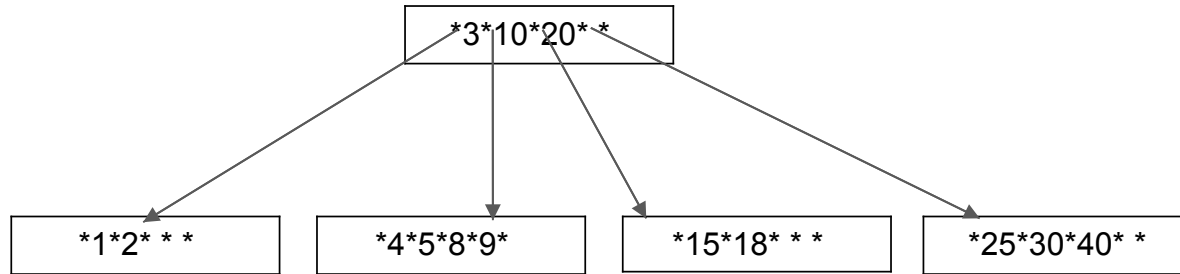
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, **25**, 40, 33



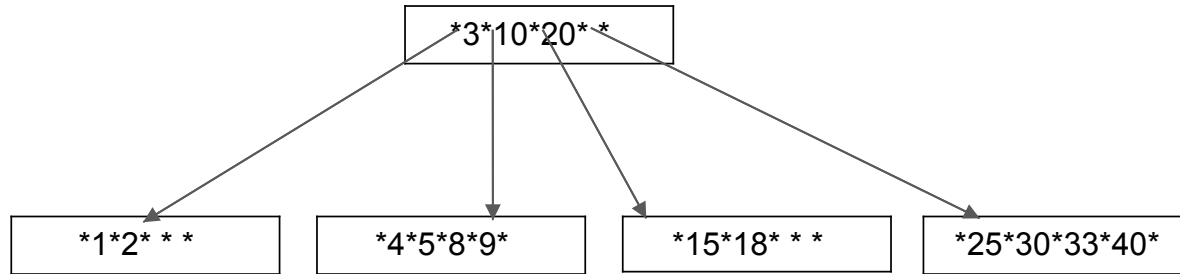
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, 25, **40**, 33



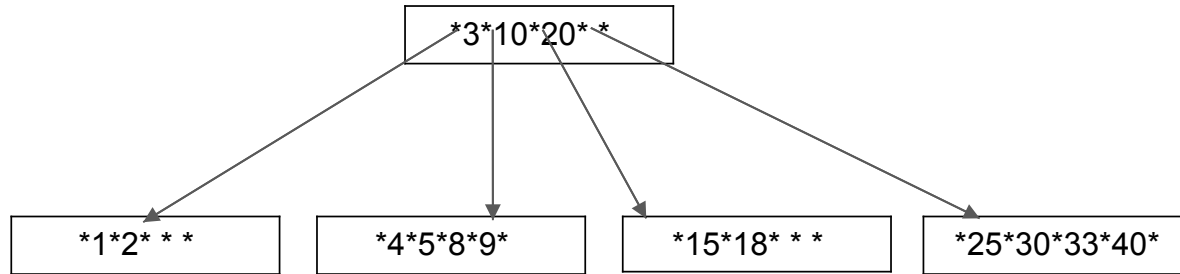
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, 25, 40, **33**



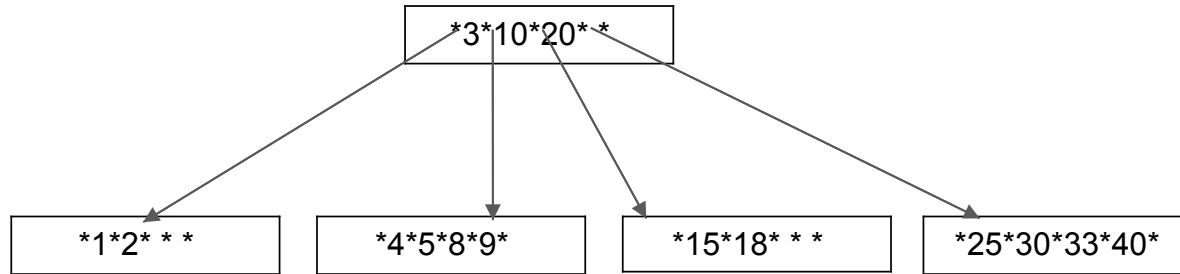
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, 25, 40, 33



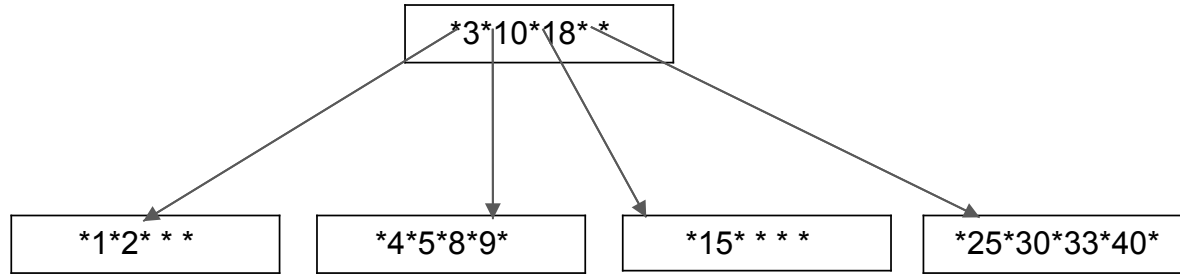
Exercício 5

Removendo: 20, 3, 5



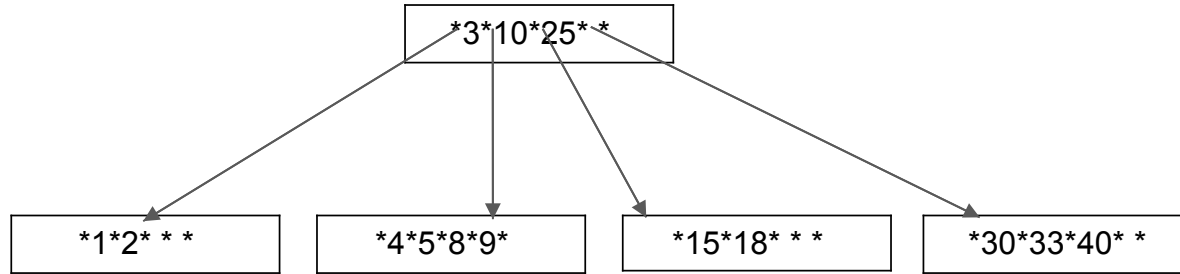
Exercício 5

Removendo: **20**, 3, 5



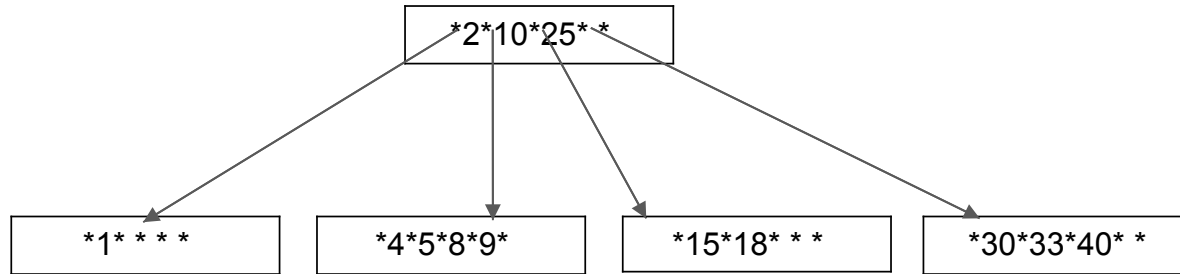
Exercício 5

Removendo: 20, 3, 5



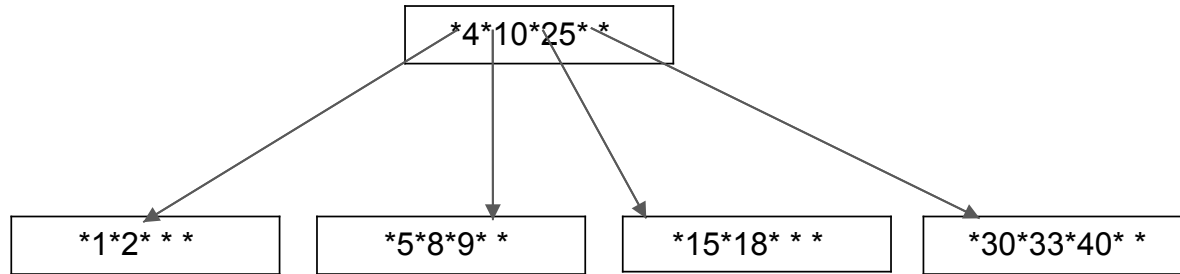
Exercício 5

Removendo: 20, **3**, 5



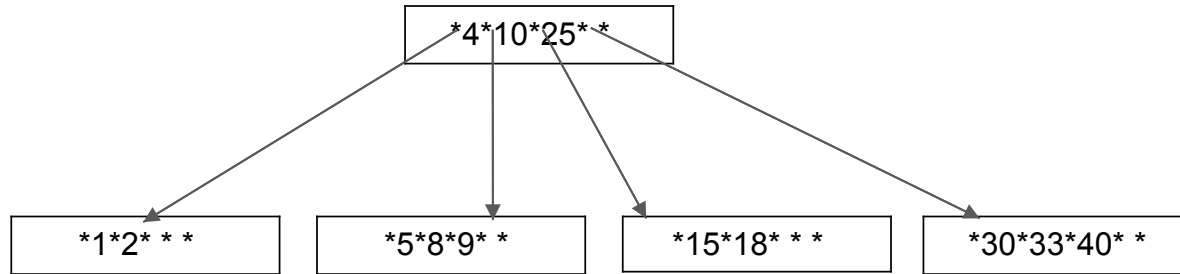
Exercício 5

Removendo: 20, **3**, 5



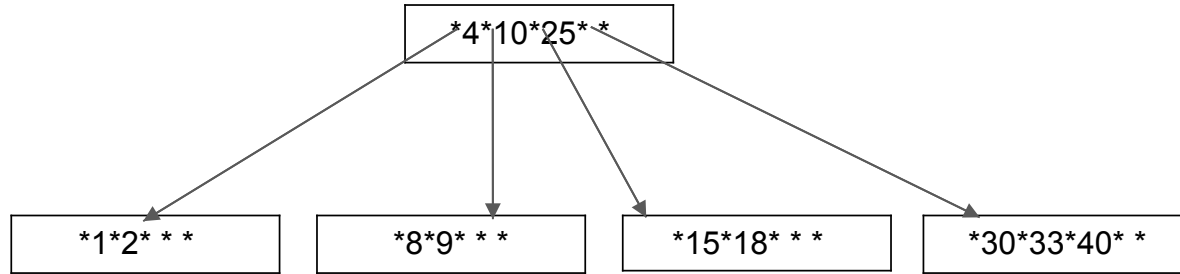
Exercício 5

Removendo: 20, 3, 5



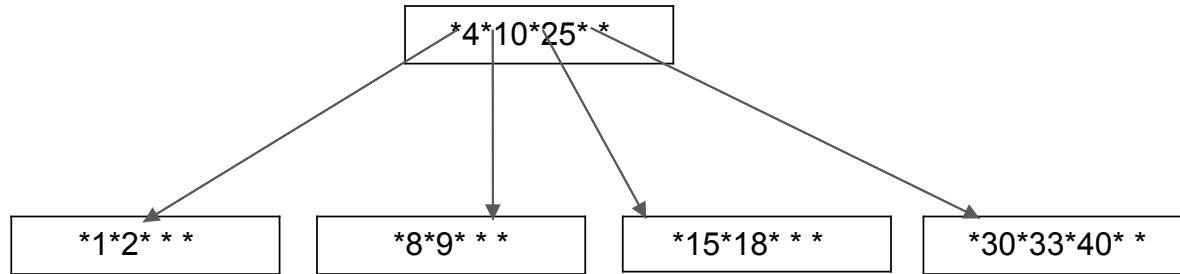
Exercício 5

Removendo: 20, 3, **5**



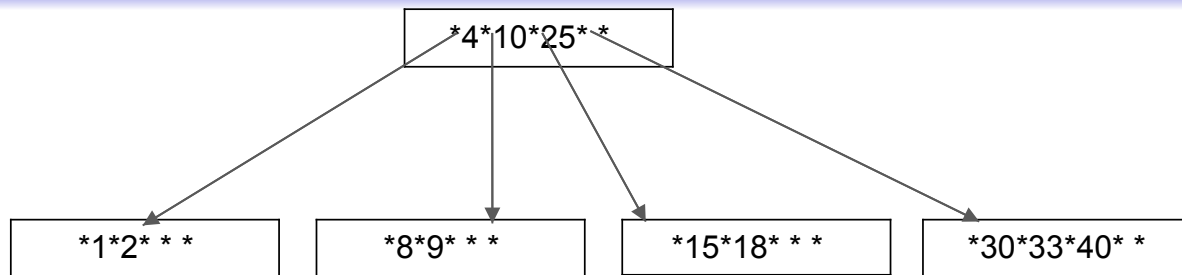
Exercício 5

Removendo: 20, 3, 5



Exercício 5

Arquivo da Árvore B



0	184													
8	2	-1	15	E10	-1	18	E11	-1						
96	2	-1	1	E3	-1	2	E4	-1						
184	3	96	4	E0	272	10	E1	8	25	E2	360			
272	2	-1	8	E5	-1	9	E6	-1						
360	3	-1	30	E7	-1	33	E8	-1	40	E9	-1			

Exercício 5

Inserindo: **10**, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, 25, 40, 33

10 * * *

Exercício 5

Inserindo: 10, **3**, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, 25, 40, 33

*3*10* * *

Exercício 5

Inserindo: 10, 3, **20**, 8, 15, 1, 9, 2, 4, 5, 30, 18, 25, 40, 33

*3*10*20* *

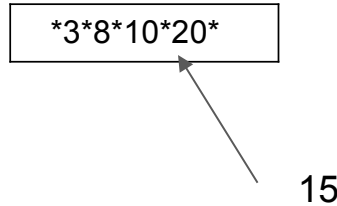
Exercício 5

Inserindo: 10, 3, 20, **8**, 15, 1, 9, 2, 4, 5, 30, 18, 25, 40, 33

*3*8*10*20*

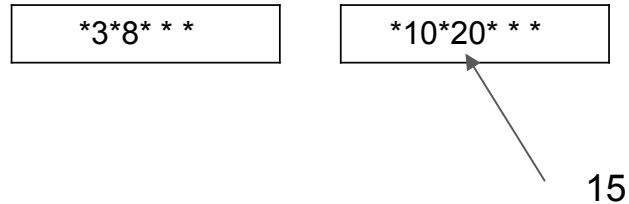
Exercício 5

Inserindo: 10, 3, 20, 8, **15**, 1, 9, 2, 4, 5, 30, 18, 25, 40, 33



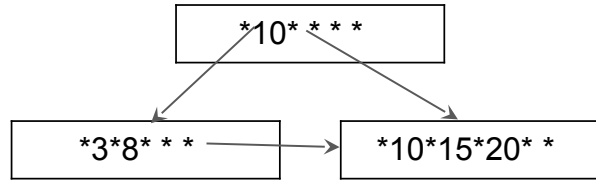
Exercício 5

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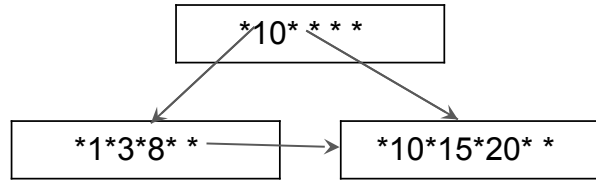
Exercício 5

Inserindo: 10, 3, 20, 8, **15**, 1, 9, 2, 4, 5, 30, 18, 25, 40, 33



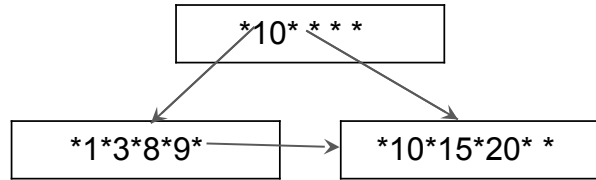
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, 25, 40, 33



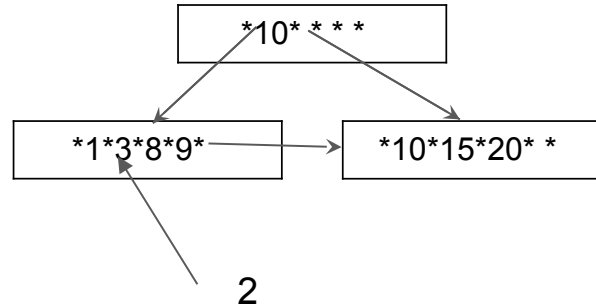
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, **9**, 2, 4, 5, 30, 18, 25, 40, 33



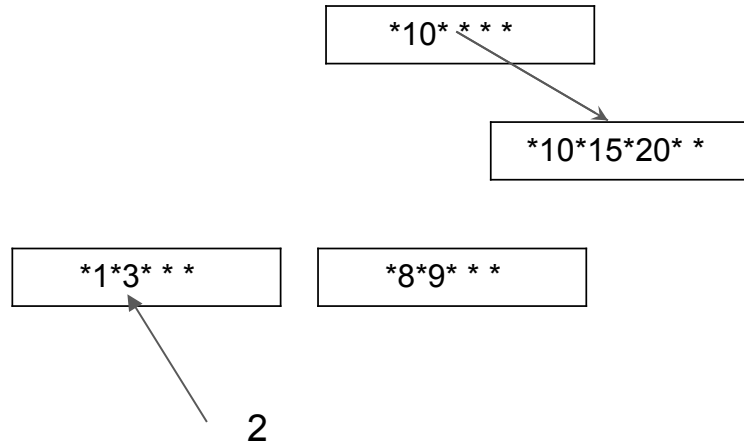
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, **2**, 4, 5, 30, 18, 25, 40, 33



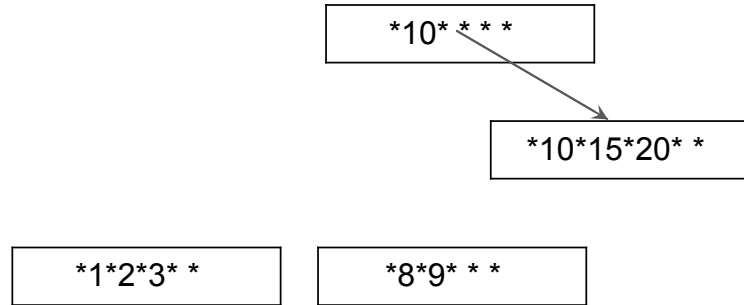
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, **2**, 4, 5, 30, 18, 25, 40, 33



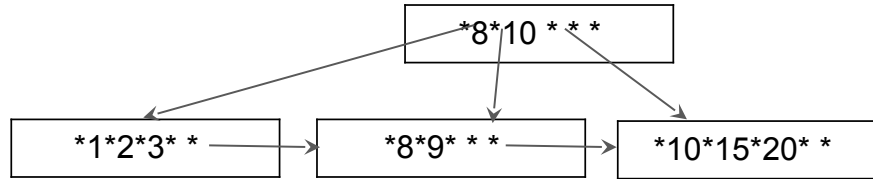
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, **2**, 4, 5, 30, 18, 25, 40, 33



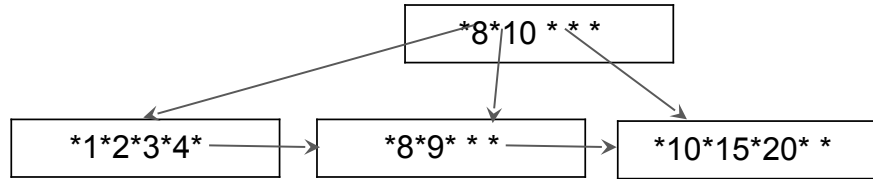
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, **2**, 4, 5, 30, 18, 25, 40, 33



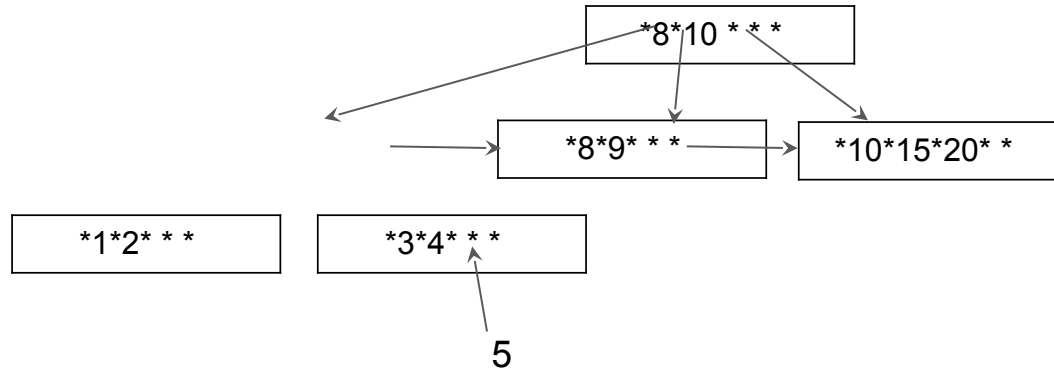
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, 25, 40, 33



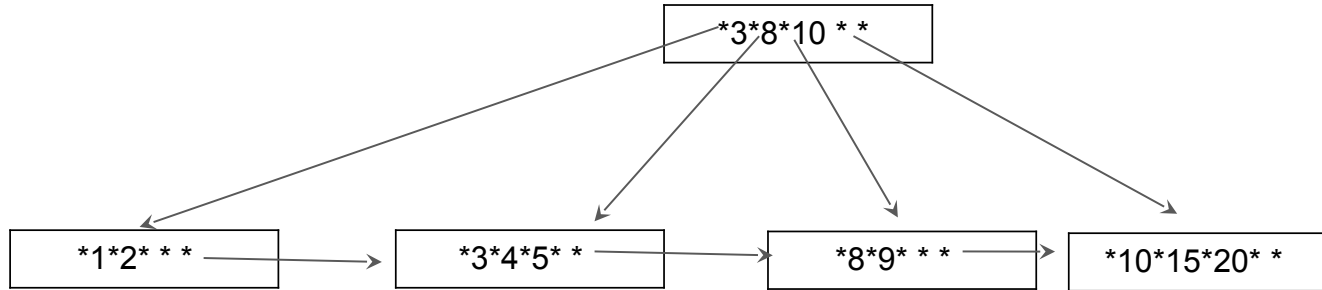
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, **5**, 30, 18, 25, 40, 33



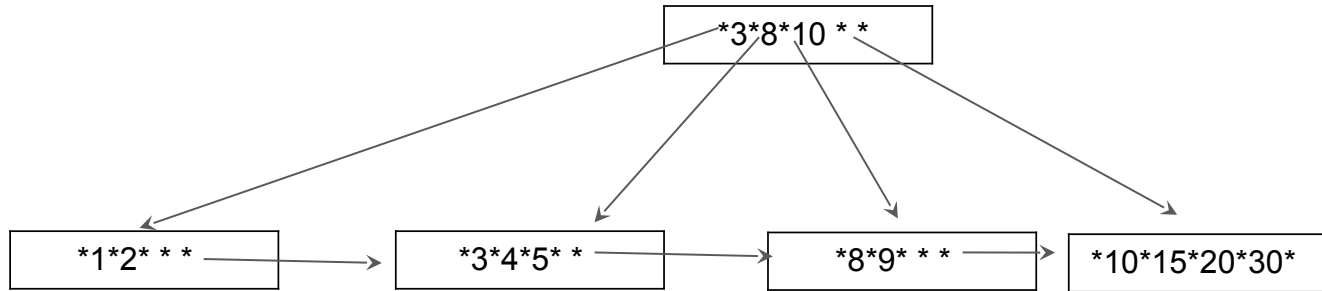
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, **5**, 30, 18, 25, 40, 33



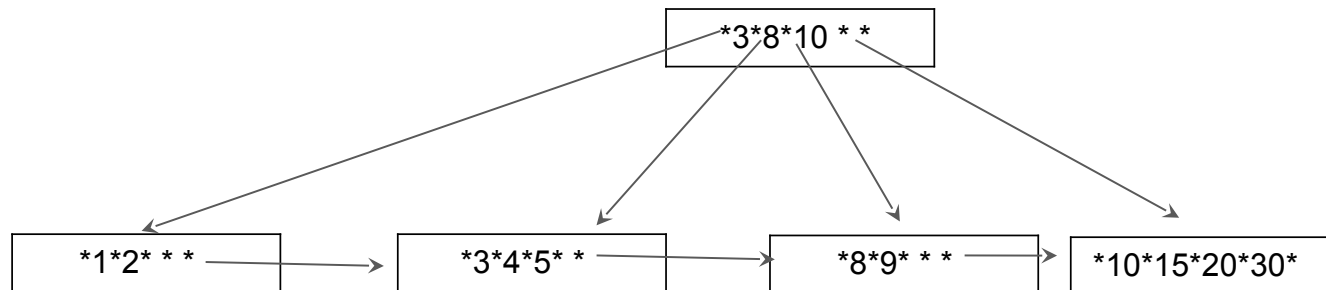
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, **30**, 18, 25, 40, 33



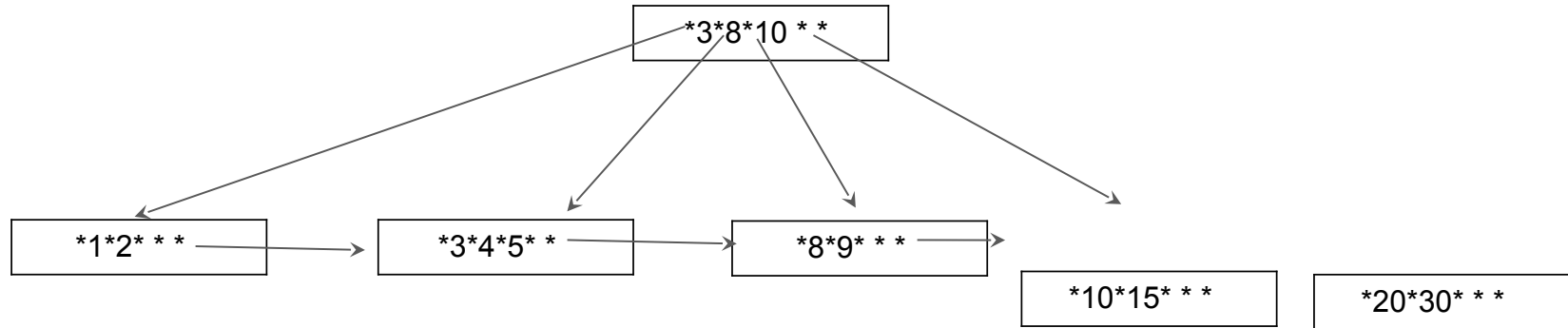
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, **18**, 25, 40, 33



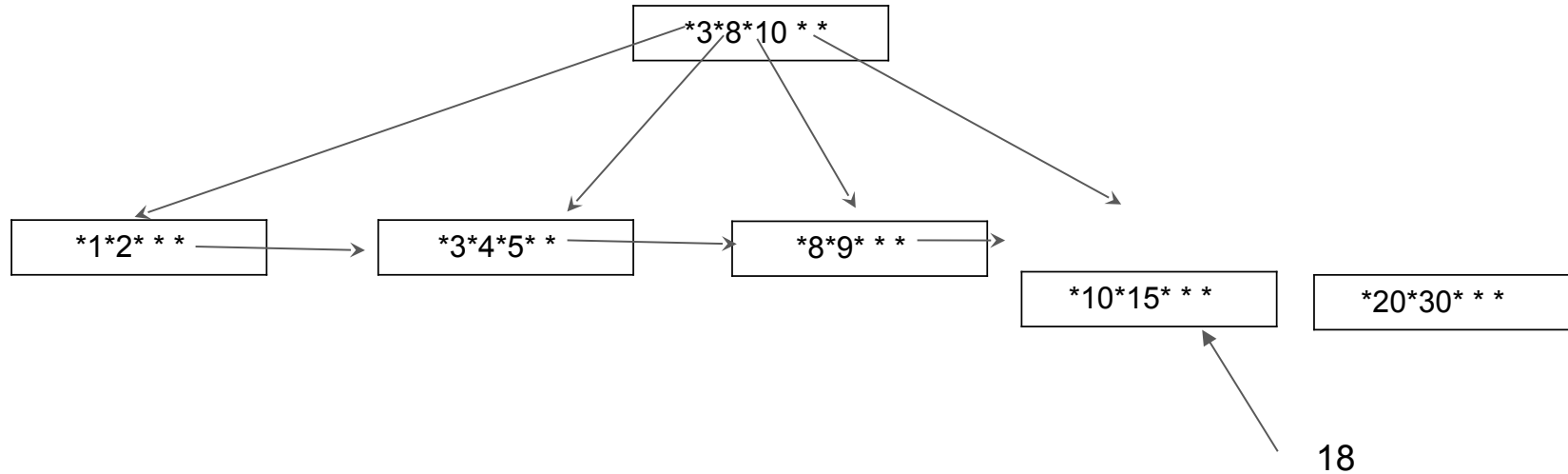
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, **18**, 25, 40, 33



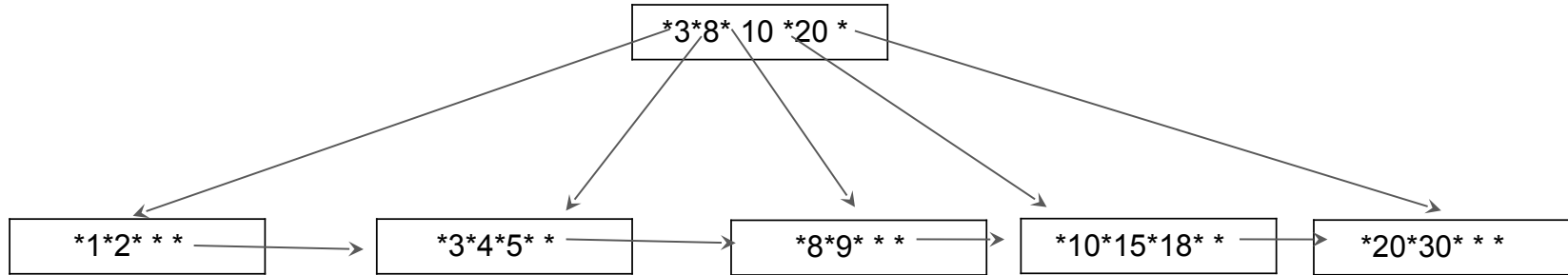
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, **18**, 25, 40, 33



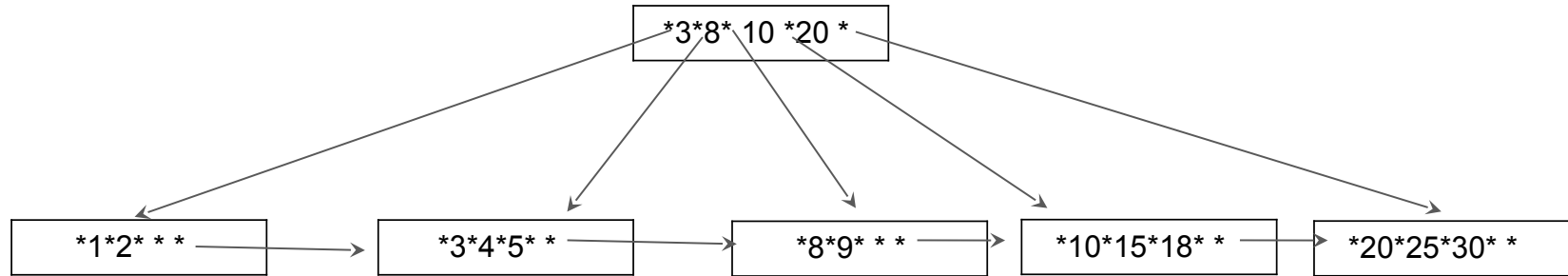
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, **18**, 25, 40, 33



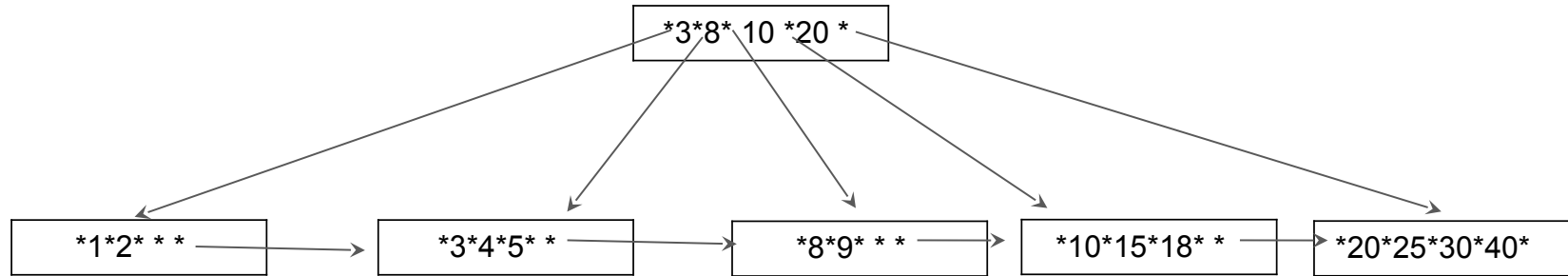
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, **25**, 40, 33



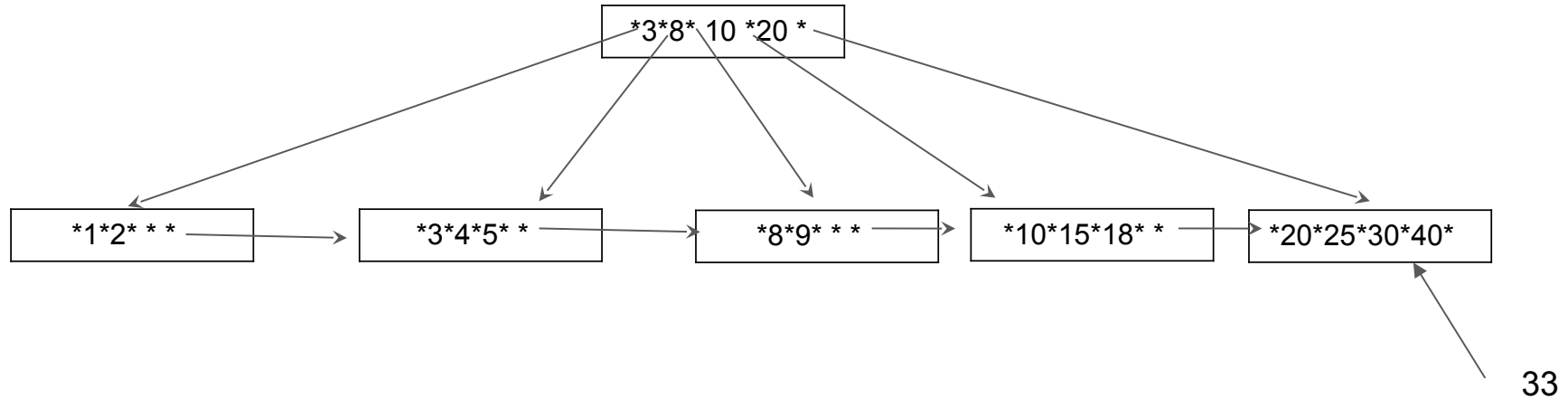
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, 25, **40**, 33



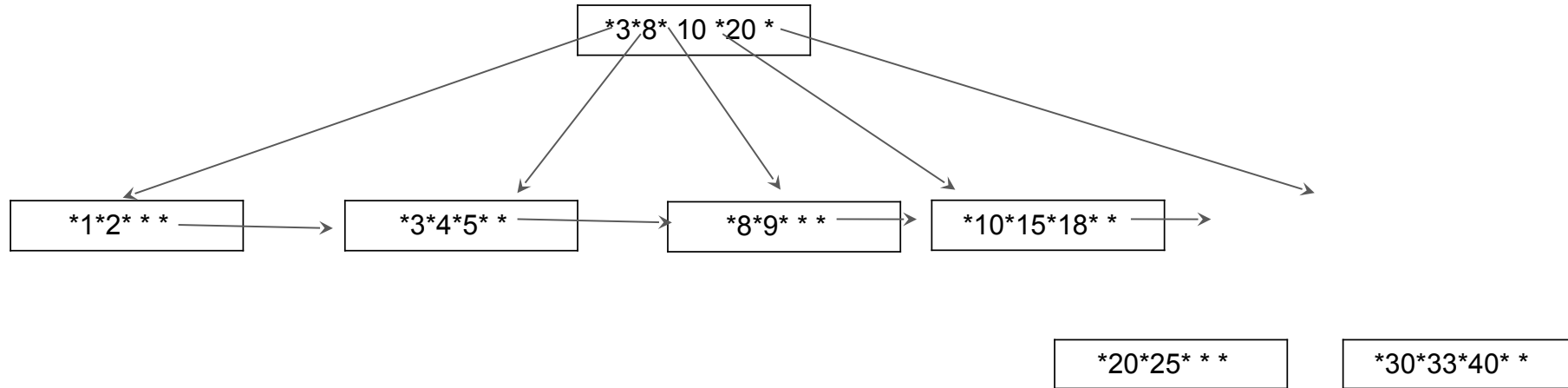
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, 25, 40, **33**



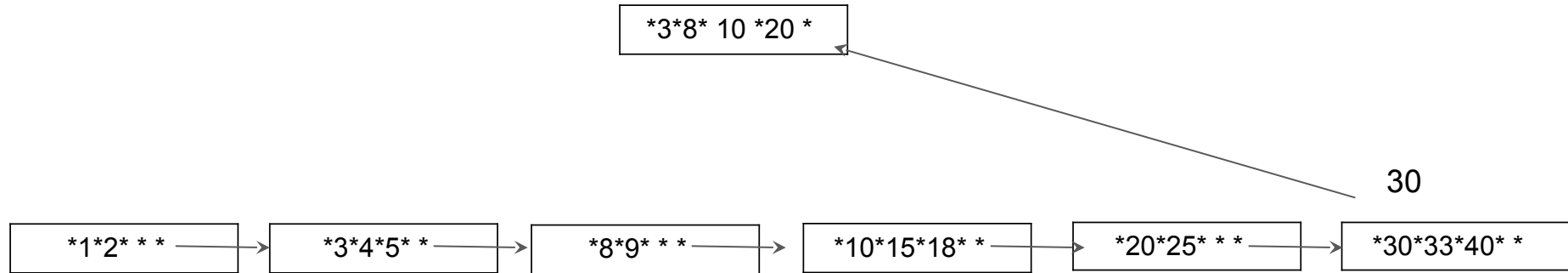
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, 25, 40, **33**



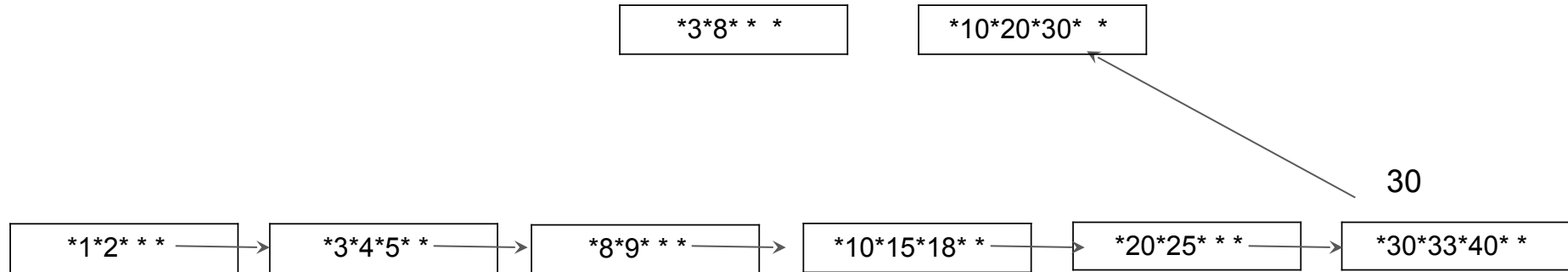
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, 25, 40, **33**



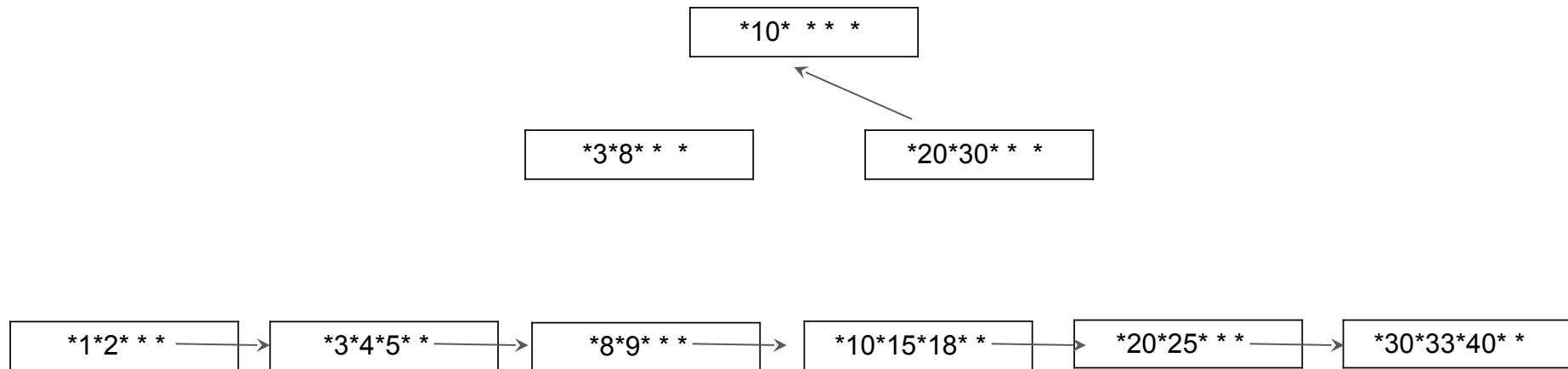
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, 25, 40, **33**



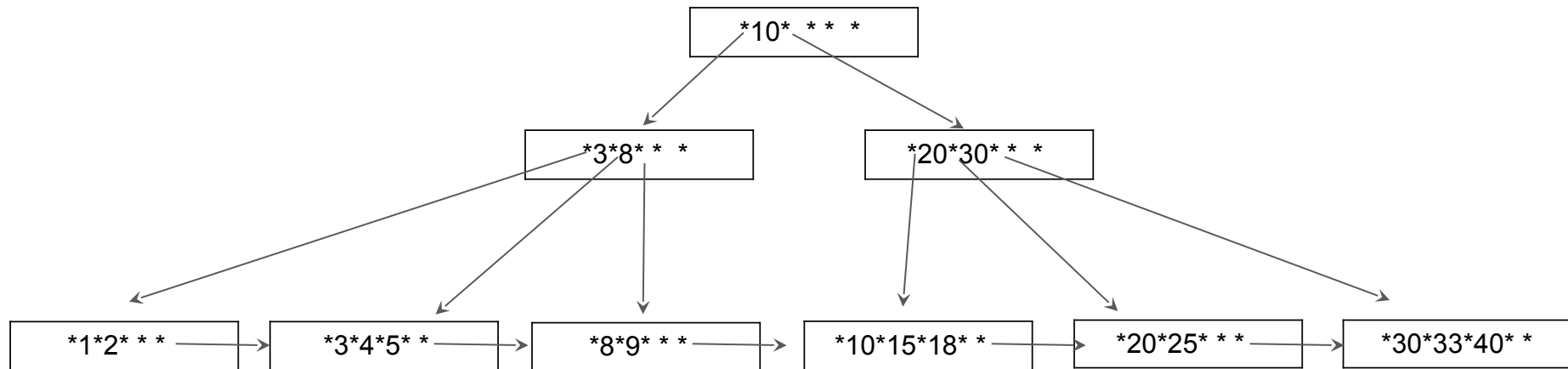
Exercício 5

Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, 25, 40, **33**



Exercício 5

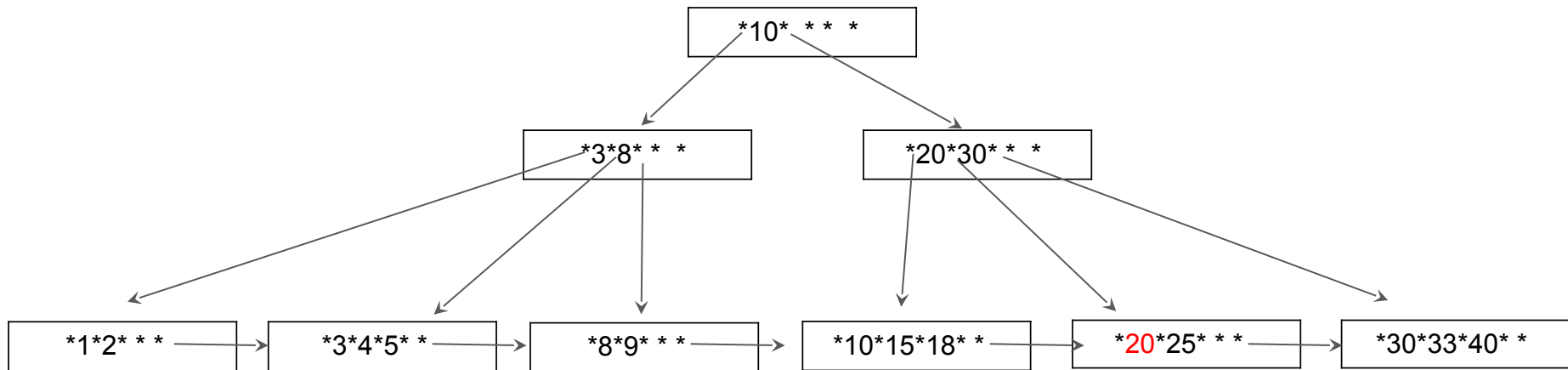
Inserindo: 10, 3, 20, 8, 15, 1, 9, 2, 4, 5, 30, 18, 25, 40, **33**





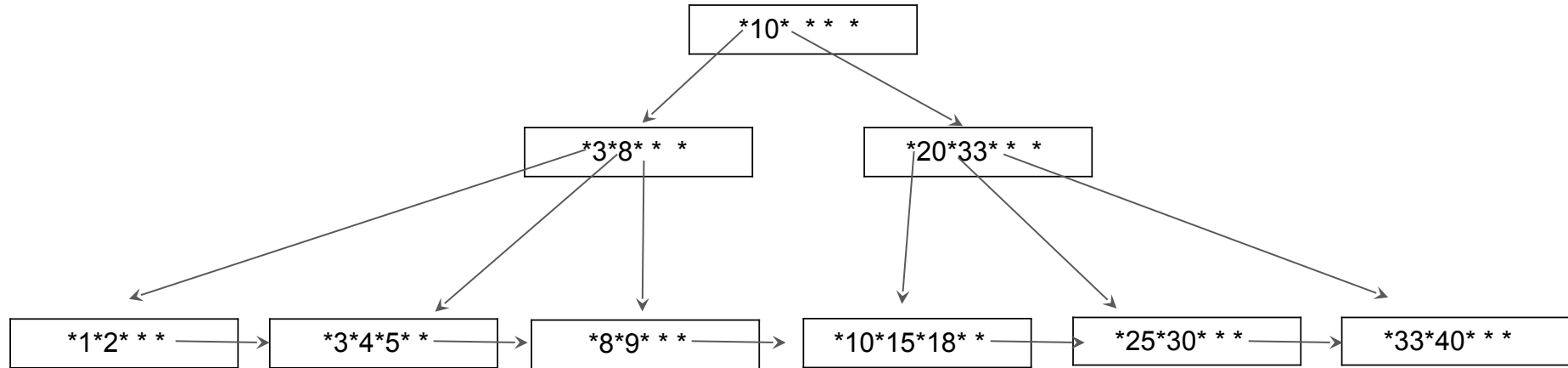
Exercício 5

Removendo: **20**, 3, 5



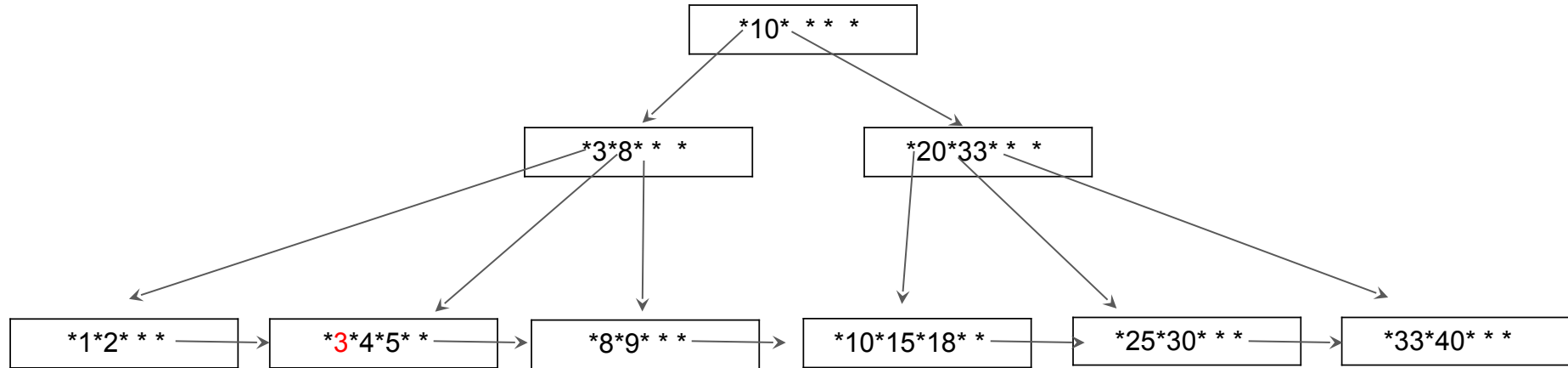
Exercício 5

Removendo: **20**, 3, 5



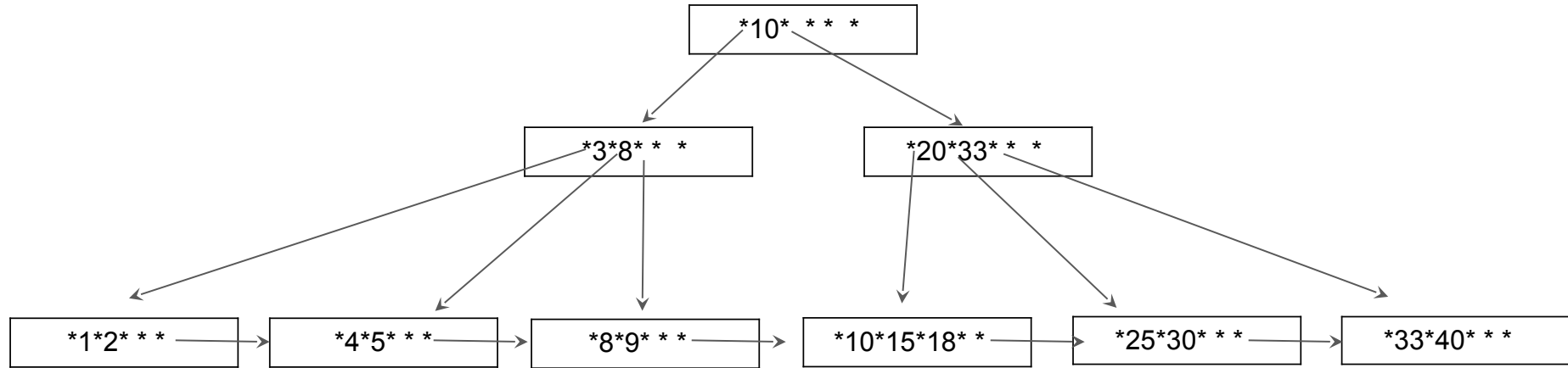
Exercício 5

Removendo: 20, 3, 5



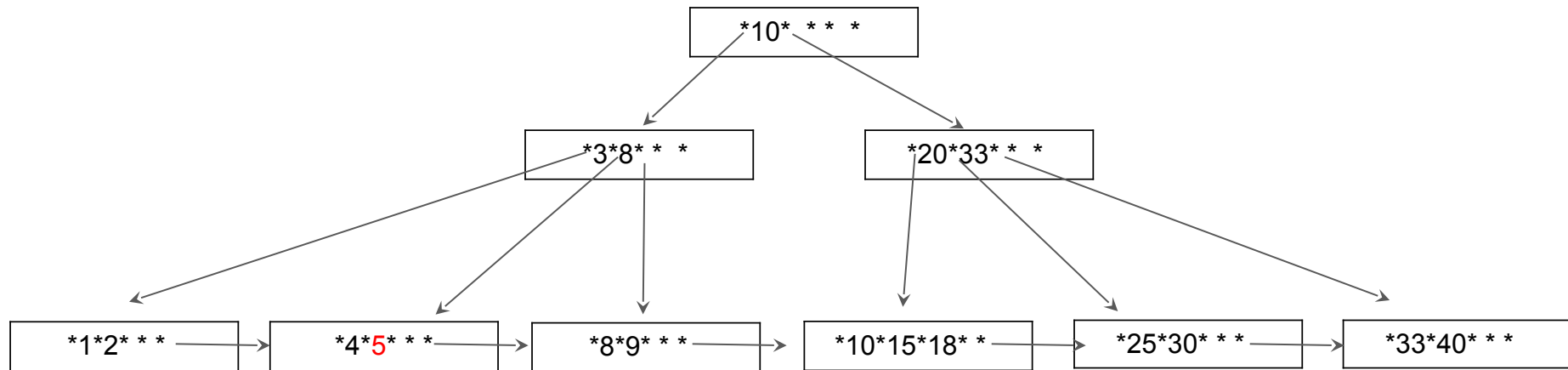
Exercício 5

Removendo: 20, 3, 5



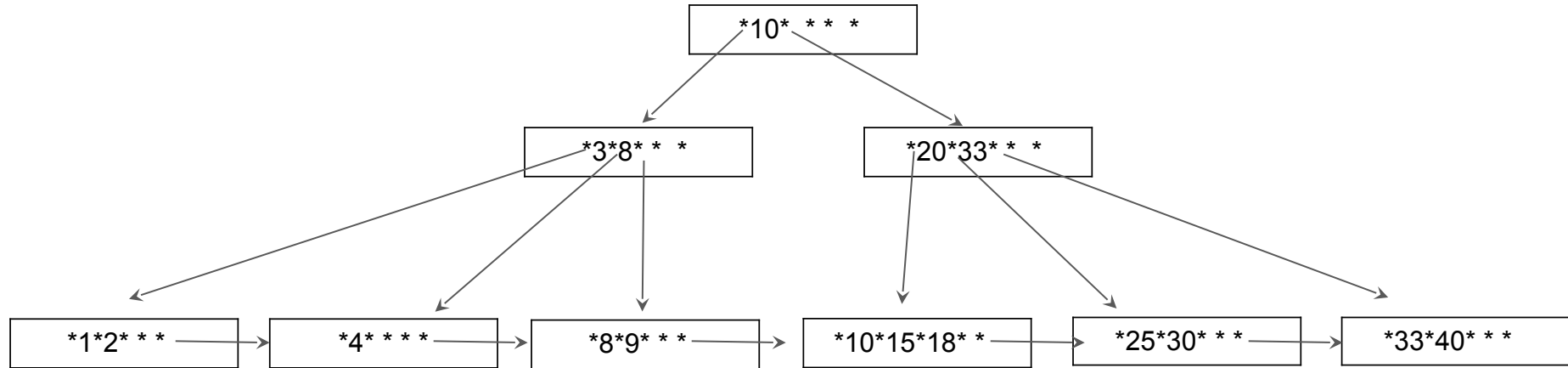
Exercício 5

Removendo: 20, 3, 5



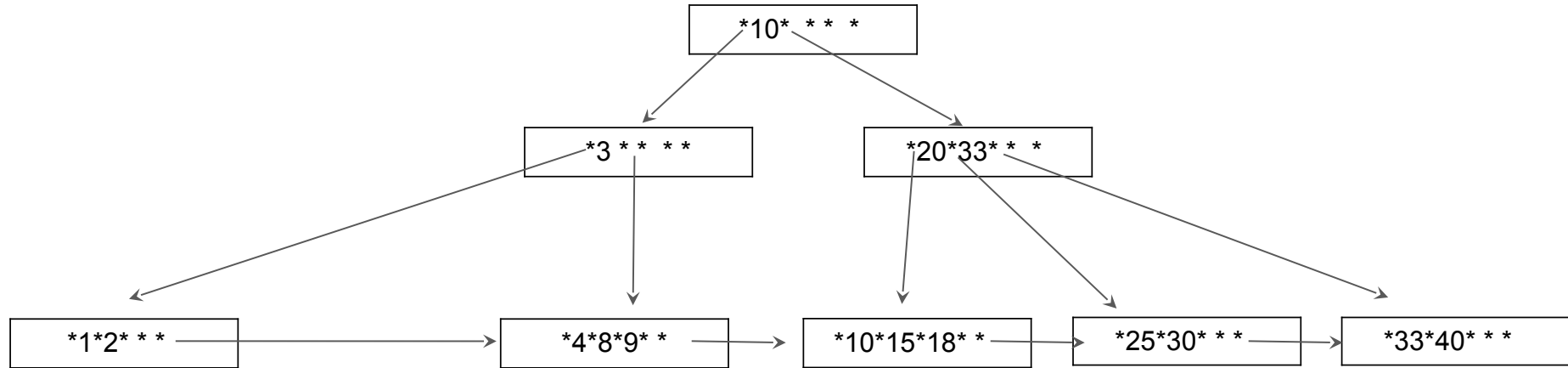
Exercício 5

Removendo: 20, 3, 5



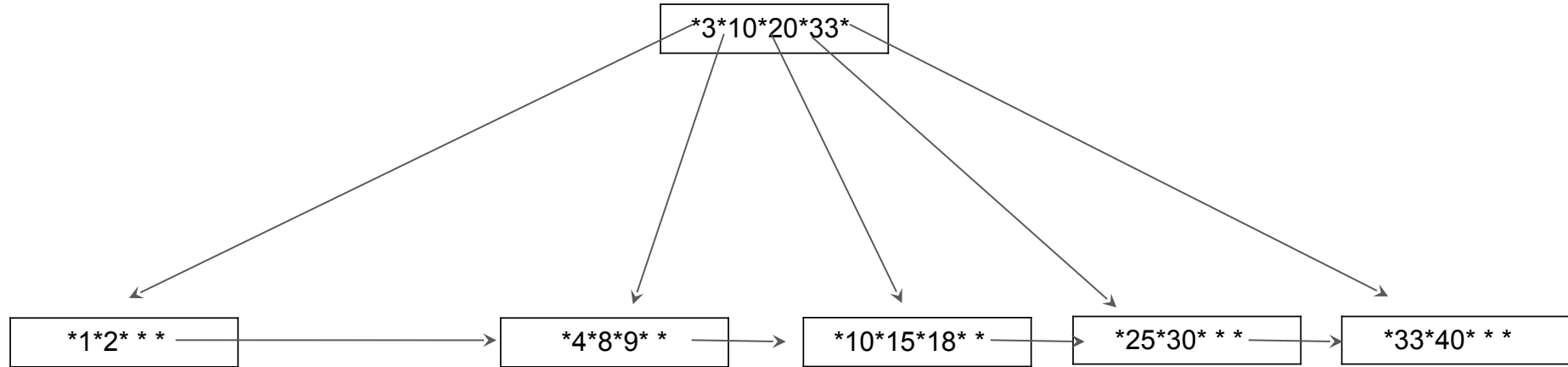
Exercício 5

Removendo: 20, 3, 5



Exercício 5

Removendo: 20, 3, 5



Exercício 5

Arquivo da Árvore B+

