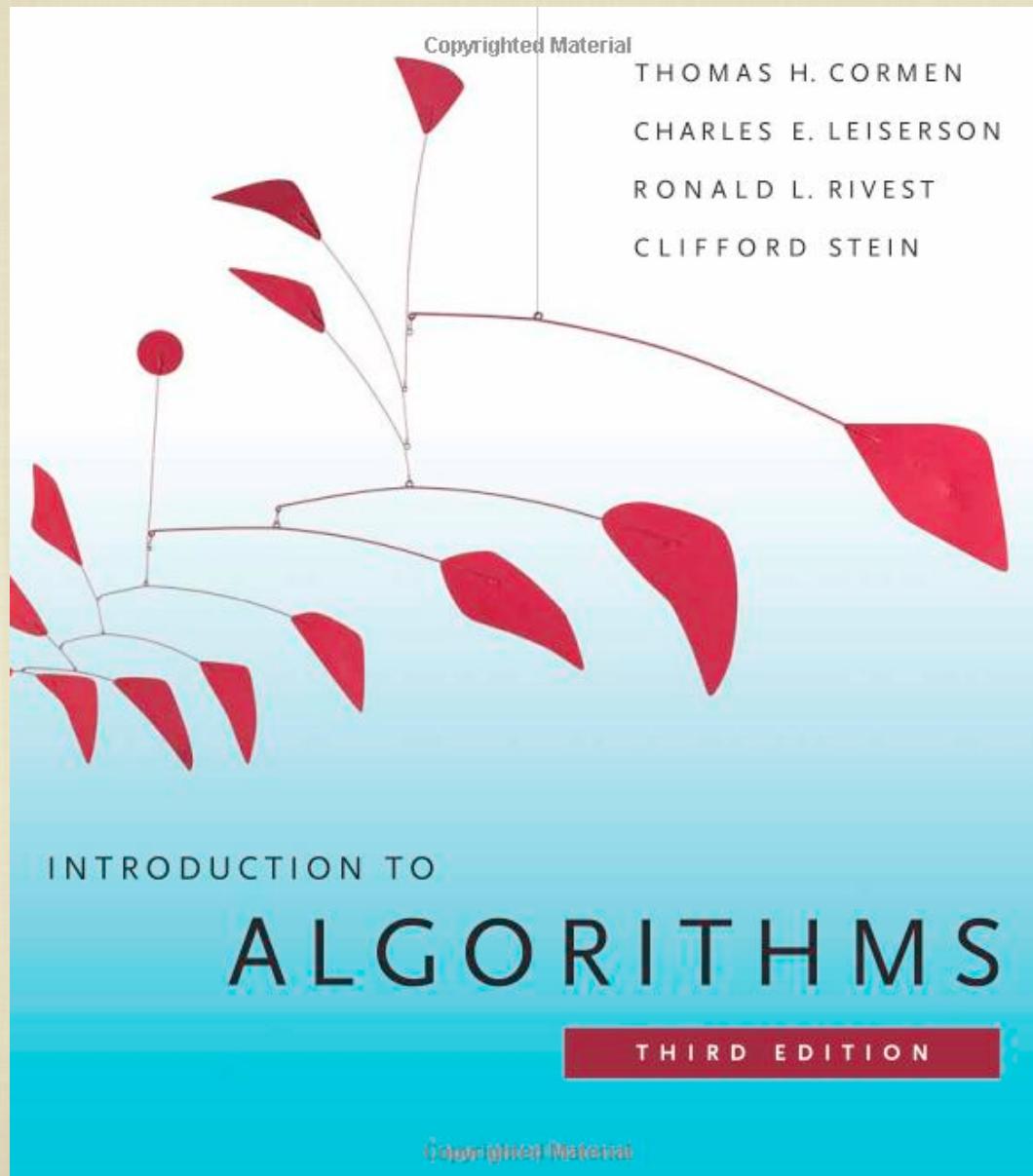


INFO1056
DESAFIOS DE
PROGRAMAÇÃO

PROF. JOÃO COMBA

TÉCNICAS ALGORÍTMICAS



TÉCNICAS ALGORÍTMICAS

- **COMPETITIVE PROGRAMMING:**
 - ESTRUTURAS DE DADOS E BIBLIOTECAS
 - PARADIGMAS DE RESOLUÇÃO DE PROBLEMAS (DC, GULOSO, DP)
 - GRAFOS
 - MATEMÁTICA
 - PROCESSAMENTO DE STRINGS
 - GEOMETRIA
 - TÓPICOS AVANÇADOS



SÚMULA DA DISCIPLINA

- moodle: inf01056
- código inscrição: 2014-2

PORQUÊ FAZER ESSA DISCIPLINA ?

- **RAZÕES DO ALUNO:**

- CONHECER PROFUNDAMENTE AS TÉCNICAS DE PROJETO DE ALGORITMOS E SEUS RESPECTIVOS ALGORITMOS
- EXPERIÊNCIA PRÁTICA DE IMPLEMENTAR ESTES ALGORITMOS
- MELHORAR SUA ESTRATÉGIA PARA RESOLUÇÃO DE PROBLEMAS E ESTIMULAR CRIATIVIDADE
- EVENTUAL PARTICIPAÇÃO EM MARATONAS CONTA NO CURRICULUM, E PODE ABRIR PORTAS PARA MELHORES EMPREGOS, E/OU POSIÇÕES ACADÊMICAS (MESTRADO OU DOUTORADO)

PORQUÊ FAZER ESSA DISCIPLINA ?



Luiz Scheidegger
Sw Engineering
Facebook



Daniel KO
PhD Student
New York University

Histórias de sucesso

Jovens talentos, do INF para o mundo



Gabriel Marques Portal, natural de Porto Alegre, ingressou em 2006/1 na graduação em Ciência da Computação e se formou em

A nova geração de Cientistas da Computação está chegando ao mercado cada vez mais cedo e mais capacitada. A cada semestre, centenas de estudantes ingressam na Universidade animados com o sonho de se formar e alcançar um bom emprego. E a cada semestre outra centena de acadêmicos conclui a graduação, já contando com um futuro certo e promissor. A história destes dois jovens é um exemplo e incentivo para todos. Mostra também o resultado de uma formação bem estruturada e afinada com a realidade. A aceleração de todos os processos se deu também na universidade, e a precocidade e o talento são fatores que contribuíram



Kauê Soares da Silveira, natural de Porto Alegre mas criado em Jaguarão, voltou para a capital quando passou no vestibular para

PORQUÊ ENSINAR ESTA DISCIPLINA ?

- **RAZÕES DO PROFESSOR:**

- ESTABELECER A UFRGS COMO CENTRO DE REFERÊNCIA NO ENSINO DE COMPUTAÇÃO
- FORMAR ALUNOS DE ALTA QUALIDADE COM FORTE FORMAÇÃO DE ALGORITMOS E PROGRAMAÇÃO
- MERCADO DE TRABALHO
- MESTRADO E OU DOUTORADO
- ESTE PROCESSO DE TREINAMENTO É EXTREMAMENTE GRATIFICANTE

MOTIVAÇÃO ADICIONAL

- MARATONA:
 - 10-11 PROBLEMAS
 - 5 HORAS PARA RESOLVER (C, C++, JAVA)
 - TIMES DE 3 PESSOAS
 - 1 COMPUTADOR
 - SEM ACESSO A INTERNET E OUTRAS MÍDIAS
 - ACESSO A NOTAS PESSOAIS E LIVROS
 - IMPRESSORA DISPONÍVEL



MARATONA DE PROGRAMAÇÃO

- **COMO FORMAR TIMES ?**
- INTEGRANTES TEM QUE SABER TRABALHAR EM GRUPO
 - 3 PESSOAS TRABALHAM MELHOR QUE 1
 - TODOS DEVEM CONHECER TODAS AS TÉCNICAS ALGORÍTMICAS E SABER RESOLVER PROBLEMAS NELAS
 - PELO MENOS 1 ESPECIALISTA NO GRUPO EM CADA TÉCNICA ALGORÍTMICA
 - LINKS: [HTTP://MARATONA.IME.USP.BR](http://MARATONA.IME.USP.BR)

FINAL BRASILEIRA



RESULTADOS 2011

#	User	Name	A	B	C	D	E	F	G	H	I	J	K	Total
1	team27/1	UFPE - Challenge Accepted !	1/22	1/97			12/299		1/172	2/137	1/42	1/111	1/50	8 (1180)
2	team23/1	ITA - Comp-Ele Error	1/47	2/128			5/-		1/228	1/69	1/95	1/96	1/11	7 (634)
3	team22/1	UFCG - Modus Ponens Malditos	1/58	1/143					3/296	1/101	1/50	2/164	1/65	7 (937)
4	team40/1	UFPR - * da Trypanossoma	1/25	2/175					1/-	1/95	1/26	1/157	1/23	6 (531)
5	team17/1	UFRJ - double cheeseburger;	1/40	1/77						5/239	1/15	1/198	1/32	6 (621)
6	team48/1	ITA - InkognITA	1/52	1/150						4/265	1/44	1/196	2/32	6 (819)
7	team51/1	UFPE - Fulano, Beltrano e Sicrano	1/58	2/201						3/208	1/25	1/270	2/65	6 (905)
8	team50/1	IME-USP - Up	1/19	5/-						1/135	1/31	1/95	1/66	5 (346)
9	team12/1	UFRGS - GCV	1/58	2/-						1/124	1/41	2/192	1/18	5 (453)
10	team29/1	Unicamp - Unicamp Alfa	1/46	1/217					9/-	1/24	1/126	2/28	5 (481)	
11	team37/1	UFG - Monkeys	1/58							3/209	1/24	1/-	1/45	4 (374)
12	team3/1	IME-USP - ASA	2/175							1/166	1/62	1/-	1/32	4 (475)
13	team47/1	UECE - Colecionadores de Baloes	2/82							3/234	2/59	2/-	1/47	4 (512)
14	team20/1	UFMG - FD*	3/145								1/115	1/273	1/36	4 (609)
15	team31/1	PUC-Rio - Pedrinhos e Luizinha + Samba	1/187							1/281	1/123	4/-	2/55	4 (646)
16	team5/1	UFSCar-Sorocaba - Platypus	1/35							3/-	1/70	2/-	1/19	3 (124)
17	team30/1	UERJ - O Grande Espaco em Branco	2/61	5/-							1/20	2/-	1/16	3 (127)
18	team38/1	UFU - Renegadores	2/27							7/-	2/59	2/-	1/56	3 (194)
19	team8/1	ICMC-USP - Dona Margarida	2/74	5/-						3/-	1/51		1/32	3 (197)
20	team4/1	UFAC - Androidos	1/32							5/-	1/103	2/-	1/71	3 (206)

RESULTADOS 2011



MUNDIAL 2013 / RÚSSIA

ACM-ICPC World Champions **2013**

Saint Petersburg
National Research University ITMO



IBM | event sponsor

come ICIPAN

Petersburg National Research University of IT, Mechanics and Optics
World Champions

world finals ↗
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Activities
Local Information
World Finals Rules
On-Site Registration
Video/Photo Coverage
World Finals Results
Past Problems
ICPC Challenge
Fact Sheet
Prog. Environment

regionals ↗
Regional Finder
Upcoming Regionals
Regional results
Regional Rules
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Starting a Regional
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With the collaboration of



Welcome to the UVa Online Judge

Here you will find hundreds of problems. They are like the ones used during programming contests, and are available in HTML and PDF formats. You can submit your sources in a variety of languages, trying to solve any of the problems available in our database.

See the new [Contest Rankings](#) section at the Live Rankings link.

Now you can use the new [Quick access, info and search](#) option on the left menu for easier navigation.
(The tool will be updated next days for a more complete information)

 Follow us on Twitter @UVaOnlineJudge !!

Are you proud of your solutions? Do you have anything to show the rest of the problemsolvers? We're looking for people to help us in the publishing of a collection of books with solutions for the problems in the UVa Online Judge. More information [here](#).

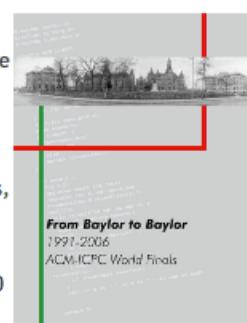
Categorized set of problems



This book contains a collection of relevant data structures, algorithms, and programming tips written for University students who want to be more competitive in the ACM International Collegiate Programming Contest (ICPC), high school students who are aspiring to be competitive in the International Olympiad in Informatics (IOI), coaches for these competitions, and basically anyone who loves problem solving using computer programs (click on the picture for buying it).

From Baylor to Baylor

Now 25% off in paperback and available as a PDF download!



From Baylor to Baylor preserves the legacy of the ACM-ICPC World Finals. The book contains all the problems used during the 1991 to 2006 competitions, carefully typesetted and formatted to the highest standard. Also, almost 100 figures have been completely redrawn to improve their printed quality. Prefaced by William B. Poucher from Baylor University (Texas) and coordinated by Miguel A.

Looking for a Challenge?
The Ultimate Problem Set from
the University of Warsaw
Programming Competitions



Coming Contests

(click to see your local time)

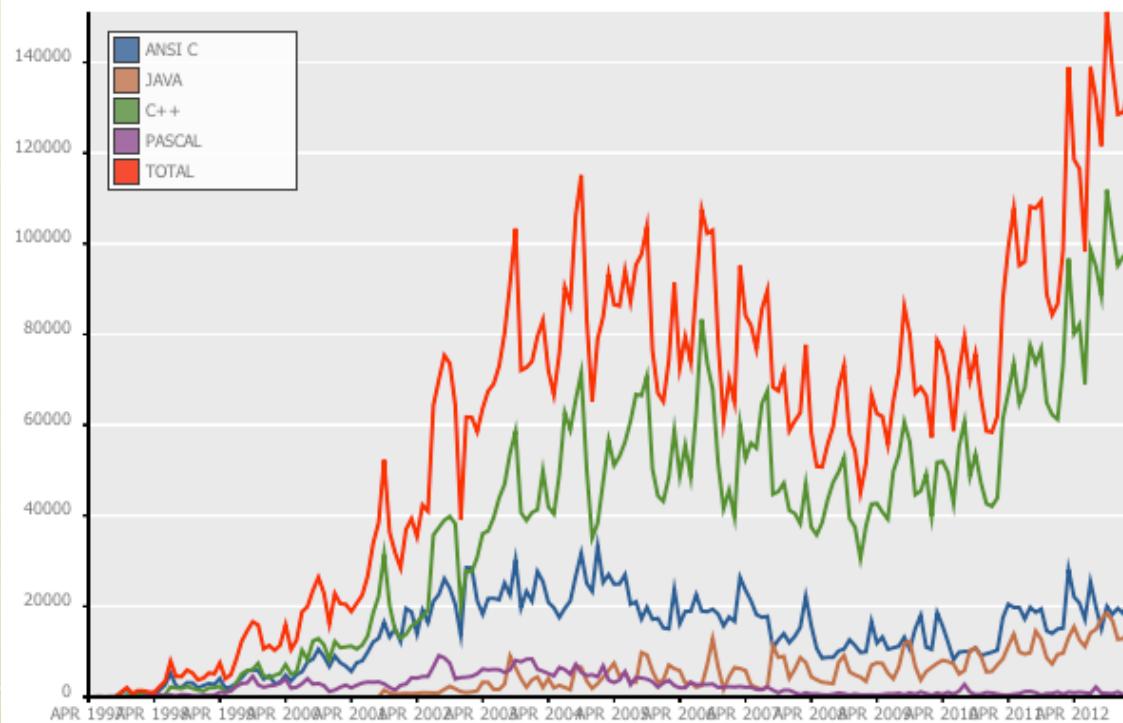
XII Programming Olympiads in Murcia (Spain)
2014-10-03 15:00:00 UTC



More contests in
www.codemarshall.com

ESTATÍSTICAS

	Total	ANSI C	JAVA	C++	PASCAL				
1997	4031	3390	84.10%	0	0.00%	639	15.85%	2	0.05%
1998	42375	24697	58.28%	0	0.00%	13859	32.71%	3819	9.01%
1999	109202	44860	41.08%	0	0.00%	42226	38.67%	22116	20.25%
2000	199523	71895	36.03%	0	0.00%	95173	47.70%	32455	16.27%
2001	345305	124223	35.97%	3029	0.88%	187852	54.40%	30201	8.75%
2002	610151	227779	37.33%	13567	2.22%	305969	50.15%	62836	10.30%
2003	874762	282206	32.26%	37726	4.31%	481173	55.01%	73657	8.42%
2004	998194	279821	28.03%	41387	4.15%	607279	60.84%	69707	6.98%
2005	1050528	275220	26.20%	64898	6.18%	662432	63.06%	47978	4.57%
2006	999155	221526	22.17%	61752	6.18%	684062	68.46%	31815	3.18%
2007	914504	208229	22.77%	64815	7.09%	619607	67.75%	21853	2.39%
2008	730266	148037	20.27%	66985	9.17%	507514	69.50%	7730	1.06%
2009	782065	150784	19.28%	80082	10.24%	543717	69.52%	7482	0.96%
2010	828697	135284	16.32%	89154	10.76%	592933	71.55%	11326	1.37%
2011	1104715	201236	18.22%	118430	10.72%	776199	70.26%	8850	0.80%
2012	1468476	236197	16.08%	165517	11.27%	1054852	71.83%	11910	0.81%
2013	342931	53937	15.73%	34203	9.97%	253523	73.93%	1268	0.37%
Total	11404880	2689321	23.58%	841545	7.38%	7429009	65.14%	445005	3.90%



RESULTADOS DO JUIZ

- # Accepted (AC) - Congratulations!
- # Presentation Error (PE) - Check for spaces, left/right justification, line feeds, etc.
- # Accepted (PE) - Your program has a minor presentation error, but the judge is letting you off with a warning. Stop here and declare victory!
- # Wrong Answer (WA) - Your program returned an incorrect answer to one or more secret test cases.
- # Compile Error (CE) - The compiler could not figure out how to compile your program. The resulting compiler messages will be returned to you. Warning messages are ignored by the judge.
- # Runtime Error (RE) - Your program failed during execution due to a segmentation fault, floating point exception, or similar problem. Its dying message will be sent back to you. Check for invalid pointer references or division by zero.
- # Submission Error (SE) - You did not correctly specify one or more of the information fields, perhaps giving an incorrect user ID or problem number.
- # Time Limit Exceeded (TL) - Your program took too much time on at least one of the test cases, so you likely have a problem with efficiency.
- # Memory Limit Exceeded (ML) - Your program tried to use more memory than the judge's default settings.
- # Output Limit Exceeded (OL) - Your program tried to print too much output, perhaps trapped in a infinite loop.
- # Restricted Function (RF) - Your source program tried to use an illegal system function such as fork() or fopen(). Behave yourself.

C

STANDARD INPUT/OUTPUT

```
#include <stdio.h>
int main() {
    long a, b, c;
    while (scanf("%ld %ld", &a, &b) != EOF) {
        if (b > a) c = b-a; else c = a-b;
        printf("%ld\n", c);
    }
    return 1;
}
```

C++

STANDARD INPUT/OUTPUT

```
#include <iostream>
using namespace std;
int main() {
    long long a, b, c;
    while (cin >> a >> b) {
        if (b > a) c = b-a; else c = a-b;
        cout << c << endl;
    }
    return 1;
}
```