



Problem A

Sudoku

Input File: A.IN

Output File: standard output

Program Source File: A.C, A.CPP, A.JAVA

A Sudoku grid is a 16x16 grid of cells grouped in sixteen 4x4 squares, where some cells are filled with letters from **A** to **P** (the first 16 capital letters of the English alphabet), as shown in figure 1a. The game is to fill all the empty grid cells with letters from **A** to **P** such that each letter from the grid occurs once only in the line, the column, and the 4x4 square it occupies. The initial content of the grid satisfies the constraints mentioned above and guarantees a unique solution.

		A				C					O	I
	J			A	B	P	C	G	F		H	
		D		F	I	E					P	
	G		E	L	H				M	J		
			E				C			G		
	I			K	G	A	B			E		J
D		G	P		J	F					A	
	E			C	B		D	P			O	
E		F		M		D		L		K		A
	C						O		I		L	
H		P	C		F	A			B			
		G		O	D			J				H
K			J			H	A		P		L	
		B		P		E		K			A	
	H		B		K		F	I		C		
		F			C		D		H		N	

a) Sudoku grid

F	P	A	H	M	J	E	C	N	L	B	D	K	O	G	I
O	J	M	I	A	N	B	D	P	K	C	G	F	L	H	E
L	N	D	K	G	F	O	I	J	E	A	H	M	B	P	C
B	G	C	E	L	K	H	P	O	F	I	M	A	J	D	N
M	F	H	B	E	L	P	O	A	C	K	J	G	N	I	D
C	I	L	N	K	D	G	A	H	B	M	O	P	E	F	J
D	O	G	P	I	H	J	M	F	N	L	E	C	A	K	B
J	E	K	A	F	C	N	B	G	I	D	P	L	H	O	M
E	B	O	F	P	M	I	J	D	G	H	L	N	K	C	A
N	C	J	D	H	B	A	E	K	M	O	F	I	G	L	P
H	M	P	L	C	G	K	F	I	A	E	N	B	D	J	O
A	K	I	G	N	O	D	L	B	P	J	C	E	F	M	H
K	D	E	M	J	I	F	N	C	H	G	A	O	P	B	L
G	L	B	C	D	P	M	H	E	O	N	K	J	I	A	F
P	H	N	O	B	A	L	K	M	J	F	I	D	C	E	G
I	A	F	J	O	E	C	G	L	D	P	B	H	M	N	K

b) Solution

Figure 1. Sudoku

Write a Sudoku playing program that reads data sets from a text file. Each data set encodes a grid and contains 16 strings on 16 consecutive lines as shown in figure 2. The i^{th} string stands for the i^{th} line of the grid, is 16 characters long, and starts from the first position of the line. String characters are from the set {**A,B,...,P,-**}, where - (minus) designates empty grid cells. The data sets are separated by single empty lines and terminate with an end of file. The program prints the solution of the input encoded grids in the same format and order as used for input.

Input	Output
--A----C-----O-I	FPAHMJECNLBDKOGI
-J--A-B-P-CGF-H-	OJMIANBDPKCGFLHE
--D--F-I-E----P-	LNDKGF OIJEAHMBPC
-G-EL-H----M-J--	BGCELKHPOFIMAJDN
----E----C--G---	MFHBELPOACKJGNID
-I--K-GA-B---E-J	CILNKDGAHBM OPEFJ
D-GP--J-F----A--	DOGPIHJMFNLECAKB
-E---C-B--DP--O-	JEKAF CNBGIDPLHOM
E--F-M--D--L-K-A	EBOFPMIJDGHLNKCA
-C-----O-I-L-	NCJDHBAEKMOFIGLP
H-P-C--F-A--B---	HMP LCGK FIAENBDJO
---G-OD---J----H	AKIGNODLBPJCEFMH
K---J-----H-A-P-L	KDEMJIFNCHGAOPBL
--B--P--E--K--A-	GLBCDPMHEONKJIAF
-H--B--K--FI-C--	PHNOBALKMJFIDCEG
--F---C--D--H-N-	IAFJOECGLDPBHMNK

Figure 2. Input/output sample for the grid in figure 1