

Resultados dos Problemas NETLIB - Método dos Pontos Interiores utilizando o solver HIGHS

Análise Computacional

16 de setembro de 2025

1 Informações dos Problemas

A tabela 1 apresenta informações básicas sobre cada problema da coleção NETLIB, incluindo métricas de viabilidade.

Tabela 1: Informações dos problemas NETLIB

Problema	Nº de Variáveis	Nº de Restrições	Inviab. Primal	Inviab. Dual
25fv47	1571	821	0.000e+00	1.332e-15
80bau3b	9799	2262	0.000e+00	1.377e-14
Adlittle	97	56	0.000e+00	4.547e-13
Afiro	32	27	0.000e+00	0.000e+00
Agg	163	488	0.000e+00	0.000e+00
Agg2	302	516	0.000e+00	2.132e-14
Agg3	302	516	0.000e+00	2.132e-14
BNL2	3489	2324	0.000e+00	1.116e-14
BRANDY	249	220	0.000e+00	0.000e+00
Bandm	472	305	0.000e+00	0.000e+00
Bandm1	472	305	0.000e+00	0.000e+00
Beaconfd	262	173	0.000e+00	0.000e+00
Blend	83	74	0.000e+00	4.025e-15
Boeig2	143	166	0.000e+00	6.939e-18
Boeing1	384	351	0.000e+00	2.776e-17
Bore3d	315	233	0.000e+00	0.000e+00
CAPRI	353	271	0.000e+00	0.000e+00
CYCLE	2857	1903	0.000e+00	6.990e-08
Czprob	3523	929	0.000e+00	2.842e-14
D2Q06C	5167	2171	4.349e-13	5.335e-13
D6CUBE	6184	415	2.703e-13	1.288e-14
DEGEN2	534	444	2.220e-16	0.000e+00
DEGEN3	1818	1503	1.776e-15	4.441e-16
DFL001	12230	6071	6.500e-11	7.376e-09
E226	282	223	0.000e+00	0.000e+00
ETAMACRO	688	400	0.000e+00	0.000e+00
FFFFF800	854	524	0.000e+00	2.132e-14
FINNIS	614	497	0.000e+00	0.000e+00
FIT1D	1026	24	0.000e+00	0.000e+00
PILOTWE	2789	722	0.000e+00	0.000e+00
RECIPE	180	91	0.000e+00	0.000e+00
SC105	103	105	0.000e+00	0.000e+00
SHIP04S	1458	402	0.000e+00	0.000e+00
Sc205	203	205	0.000e+00	0.000e+00
Sc50a	48	50	0.000e+00	0.000e+00
Sc50b	48	50	0.000e+00	0.000e+00
Sc50teste	48	50	0.000e+00	0.000e+00
TAHA13MPS	2	4	0.000e+00	0.000e+00
bnl1	1175	643	0.000e+00	1.052e-12
boeing2	143	166	0.000e+00	6.939e-18
fit1p	1677	627	0.000e+00	0.000e+00
fit2d	10500	25	0.000e+00	1.776e-15
fit2p	13525	3000	0.000e+00	0.000e+00
forplan	421	161	0.000e+00	0.000e+00
ganges	1681	1309	3.638e-12	4.263e-13
gfrd-pnc	1092	616	0.000e+00	0.000e+00
greenbea	5405	2392	5.022e-14	1.819e-12

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Problema	Nº de Variáveis	Nº de Restrições	Inviab. Primal	Inviab. Dual
greenbeb	5405	2392	0.000e+00	8.743e-14
grow15	645	300	0.000e+00	5.995e-12
grow22	946	440	0.000e+00	3.391e-12
grow7	301	140	0.000e+00	3.999e-13
israel	142	174	0.000e+00	0.000e+00
kb2	41	43	0.000e+00	0.000e+00
lotfi	308	153	1.819e-12	0.000e+00
maros-r7	9408	3136	0.000e+00	0.000e+00
maros	1443	846	8.882e-14	1.271e-15
modszkl	1620	687	1.819e-12	0.000e+00
nesm	2923	662	1.000e-08	1.819e-12
perold	1376	625	0.000e+00	6.106e-15
pilot	1988	940	0.000e+00	0.000e+00
pilot4	1000	410	0.000e+00	0.000e+00
pilot87	4883	2030	0.000e+00	0.000e+00
pilotnov	2172	975	1.634e-13	0.000e+00
scagr25	500	471	0.000e+00	0.000e+00
scagr7	140	129	0.000e+00	0.000e+00
scfxm1	457	330	5.500e-15	0.000e+00
scfxm2	914	660	5.500e-15	0.000e+00
scfxm3	1371	990	5.500e-15	0.000e+00
scorpion	358	388	0.000e+00	0.000e+00
scrs8	1169	490	0.000e+00	0.000e+00
scsd1	760	77	2.483e-17	2.854e-08
scsd6	1350	147	8.327e-17	7.603e-08
scsd8	2750	397	2.120e-15	1.599e-13
sctap1	480	300	0.000e+00	0.000e+00
sctap2-1	1880	1090	0.000e+00	0.000e+00
sctap2	1880	1090	0.000e+00	0.000e+00
sctap3	2480	1480	0.000e+00	3.553e-15
seba	1028	515	0.000e+00	0.000e+00
share1b	225	117	0.000e+00	0.000e+00
share2b	79	96	0.000e+00	0.000e+00
shell	1775	536	0.000e+00	0.000e+00
ship04	2118	402	0.000e+00	0.000e+00
ship04l	2118	402	0.000e+00	0.000e+00
ship08l	4283	778	0.000e+00	0.000e+00
ship08s	2387	778	0.000e+00	0.000e+00
ship12l	5427	1151	0.000e+00	3.695e-13
ship12s	2763	1151	0.000e+00	0.000e+00
sierra	2036	1227	4.547e-13	6.821e-13
stair	467	356	0.000e+00	0.000e+00
standata	1075	359	0.000e+00	0.000e+00
standgub	1184	361	0.000e+00	0.000e+00
standmps	1075	467	0.000e+00	0.000e+00
stocfor1	111	117	0.000e+00	0.000e+00
stocfor2	2031	2157	0.000e+00	0.000e+00
truss	8806	1000	8.923e-14	1.613e-10
tuff	587	333	0.000e+00	0.000e+00
vtp	203	198	0.000e+00	0.000e+00
wood1p	2594	244	0.000e+00	1.332e-15
woodw	8405	1098	0.000e+00	0.000e+00

2 Resultados de Convergência

A tabela 2 apresenta os resultados de convergência para cada problema, incluindo o número de iterações, valor da função objetivo e o gap relativo.

Tabela 2: Resultados de convergência dos problemas NETLIB

Problema	Iterações	Valor Ótimo	Valor Ótimo Primal	Valor Ótimo Dual	Gap Absoluto	Gap Relativo
25fv47	28	5.502e+03	5.502e+03	5.502e+03	4.547e-12	8.265e-16
80bau3b	43	9.872e+05	9.872e+05	1.130e+06	1.424e+05	1.443e-01
Adlittle	13	2.255e+05	2.255e+05	2.255e+05	2.910e-11	1.291e-16
Afiro	7	-4.648e+02	-4.648e+02	-4.648e+02	5.684e-14	1.223e-16
Agg	18	-3.599e+07	-3.599e+07	-3.599e+07	1.490e-08	4.140e-16
Agg2	19	-2.024e+07	-2.024e+07	-2.024e+07	5.215e-08	2.577e-15
Agg3	19	1.031e+07	1.031e+07	1.031e+07	3.725e-09	3.613e-16
BNL2	32	1.811e+03	1.811e+03	1.811e+03	2.046e-12	1.130e-15
BRANDY	17	1.519e+03	1.519e+03	1.519e+03	2.274e-13	1.497e-16
Bandm	17	-1.586e+02	-1.586e+02	-1.586e+02	3.126e-13	1.971e-15
Bandm1	17	-1.586e+02	-1.586e+02	-1.586e+02	3.126e-13	1.971e-15

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Tabela 2 – continuação da página anterior

Problema	Iterações	Valor Ótimo	Valor Ótimo Primal	Valor Ótimo Dual	Gap Absoluto	Gap Relativo
Beaconfd	11	3.359e+04	3.359e+04	3.359e+04	7.276e-12	2.166e-16
Blend	10	-3.081e+01	-3.081e+01	-3.081e+01	7.105e-15	2.306e-16
Boeig2	20	-3.150e+02	-3.150e+02	-2.823e+02	3.271e+01	1.038e-01
Boeing1	24	-3.352e+02	-3.352e+02	-3.268e+02	8.425e+00	2.513e-02
Bore3d	13	1.373e+03	1.373e+03	0.000e+00	1.373e+03	1.000e+00
CAPRI	21	2.690e+03	2.690e+03	-2.486e+03	5.176e+03	1.924e+00
CYCLE	33	-5.226e+00	-5.226e+00	0.000e+00	5.226e+00	1.000e+00
Czprob	34	2.185e+06	2.185e+06	2.185e+06	1.397e-09	6.393e-16
D2Q06C	34	1.228e+05	1.228e+05	1.228e+05	0.000e+00	0.000e+00
D6CUBE	30	3.155e+02	3.155e+02	3.103e+02	5.212e+00	1.652e-02
DEGEN2	15	-1.435e+03	-1.435e+03	-1.435e+03	1.364e-12	9.506e-16
DEGEN3	21	-9.873e+02	-9.873e+02	-9.873e+02	2.274e-12	2.303e-15
DFL001	45	1.127e+07	1.127e+07	2.504e+08	2.391e+08	2.122e+01
E226	22	-1.164e+01	-1.164e+01	-1.875e+01	7.113e+00	6.111e-01
ETAMACRO	30	-7.557e+02	-7.557e+02	-5.108e+01	7.046e+02	9.324e-01
FFFFFF800	28	5.557e+05	5.557e+05	5.557e+05	3.492e-10	6.285e-16
FINNIS	26	1.728e+05	1.728e+05	4.330e+05	2.602e+05	1.506e+00
FIT1D	19	-9.146e+03	-9.146e+03	0.000e+00	9.146e+03	1.000e+00
PILOTWE	39	-2.720e+06	-2.720e+06	-2.703e+06	1.740e+04	6.397e-03
RECIPE	13	-2.666e+02	-2.666e+02	0.000e+00	2.666e+02	1.000e+00
SC105	12	-5.220e+01	-5.220e+01	-5.220e+01	0.000e+00	0.000e+00
SHIP04S	18	1.799e+06	1.799e+06	1.799e+06	4.657e-10	2.589e-16
Sc205	12	-5.220e+01	-5.220e+01	-5.220e+01	5.684e-14	1.089e-15
Sc50a	8	-6.458e+01	-6.458e+01	-6.458e+01	0.000e+00	0.000e+00
Sc50b	8	-7.000e+01	-7.000e+01	-7.000e+01	1.421e-14	2.030e-16
Sc50teste	8	-6.458e+01	-6.458e+01	-6.458e+01	0.000e+00	0.000e+00
TAHA13MPS	4	-2.100e+01	-2.100e+01	-2.100e+01	0.000e+00	0.000e+00
bnl1	33	1.978e+03	1.978e+03	1.978e+03	1.819e-12	9.198e-16
boeing2	20	-3.150e+02	-3.150e+02	-2.823e+02	3.271e+01	1.038e-01
fit1p	17	9.146e+03	9.146e+03	9.146e+03	7.276e-12	7.955e-16
fit2d	22	-6.846e+04	-6.846e+04	0.000e+00	6.846e+04	1.000e+00
fit2p	20	6.846e+04	6.846e+04	9.456e+04	2.609e+04	3.811e-01
forplan	23	-6.642e+02	-6.642e+02	-1.035e+03	3.706e+02	5.580e-01
ganges	21	-1.096e+05	-1.096e+05	-5.851e+04	5.107e+04	4.660e-01
gfrd-pnc	16	6.902e+06	6.902e+06	-2.983e+05	7.200e+06	1.043e+00
greenbea	47	-7.256e+07	-7.256e+07	0.000e+00	7.256e+07	1.000e+00
greenbeb	36	-4.302e+06	-4.302e+06	0.000e+00	4.302e+06	1.000e+00
grow15	20	-1.069e+08	-1.069e+08	0.000e+00	1.069e+08	1.000e+00
grow22	22	-1.608e+08	-1.608e+08	0.000e+00	1.608e+08	1.000e+00
grow7	19	-4.779e+07	-4.779e+07	0.000e+00	4.779e+07	1.000e+00
israel	24	-8.966e+05	-8.966e+05	-8.966e+05	1.164e-10	1.298e-16
kb2	18	-1.750e+03	-1.750e+03	0.000e+00	1.750e+03	1.000e+00
lotfi	19	-2.526e+01	-2.526e+01	-2.526e+01	7.105e-15	2.812e-16
maros-r7	15	1.497e+06	1.497e+06	1.497e+06	2.095e-09	1.400e-15
maros	24	-5.806e+04	-5.806e+04	-2.307e+04	3.499e+04	6.026e-01
modszk1	20	3.206e+02	3.206e+02	3.206e+02	7.560e-11	2.358e-13
nesm	38	1.408e+07	1.408e+07	1.113e+08	9.719e+07	6.904e+00
perold	30	-9.381e+03	-9.381e+03	-1.124e+04	1.861e+03	1.983e-01
pilot	33	-6.113e+03	-6.113e+03	-4.922e+03	1.191e+03	1.948e-01
pilot4	31	-2.581e+03	-2.581e+03	-5.304e+01	2.528e+03	9.795e-01
pilot87	40	3.017e+02	3.017e+02	2.523e+02	4.946e+01	1.639e-01
pilotnov	27	-4.497e+03	-4.497e+03	4.962e+01	4.547e+03	1.011e+00
scagr25	17	-1.475e+07	-1.475e+07	-1.475e+07	3.725e-09	2.525e-16
scagr7	15	-2.331e+06	-2.331e+06	-2.331e+06	4.657e-10	1.997e-16
scfxm1	22	1.842e+04	1.842e+04	1.842e+04	3.638e-12	1.975e-16
scfxm2	22	3.666e+04	3.666e+04	3.666e+04	0.000e+00	0.000e+00
scfxm3	22	5.490e+04	5.490e+04	5.490e+04	5.821e-11	1.060e-15
scorpion	11	1.878e+03	1.878e+03	1.878e+03	6.821e-13	3.632e-16
scrs8	21	9.043e+02	9.043e+02	9.043e+02	5.684e-13	6.286e-16
scsd1	14	8.667e+00	8.667e+00	8.667e+00	3.553e-15	4.099e-16
scsd6	22	5.050e+01	5.050e+01	5.050e+01	1.421e-14	2.814e-16
scsd8	18	9.050e+02	9.050e+02	9.050e+02	1.023e-12	1.131e-15
sctap1	21	1.412e+03	1.412e+03	1.412e+03	0.000e+00	0.000e+00
sctap2-1	20	1.725e+03	1.725e+03	1.725e+03	2.274e-13	1.318e-16
sctap2	20	1.725e+03	1.725e+03	1.725e+03	2.274e-13	1.318e-16
sctap3	21	1.424e+03	1.424e+03	1.424e+03	0.000e+00	0.000e+00
seba	7	1.571e+04	1.571e+04	1.938e+04	3.664e+03	2.332e-01
share1b	22	-7.659e+04	-7.659e+04	-7.659e+04	1.310e-10	1.710e-15
share2b	15	-4.157e+02	-4.157e+02	-4.157e+02	3.411e-12	8.204e-15
shell	20	1.209e+09	1.209e+09	0.000e+00	1.209e+09	1.000e+00
ship04	16	1.793e+06	1.793e+06	1.793e+06	4.657e-10	2.597e-16
ship04l	16	1.793e+06	1.793e+06	1.793e+06	4.657e-10	2.597e-16
ship08l	16	1.909e+06	1.909e+06	1.909e+06	2.328e-10	1.220e-16
ship08s	14	1.920e+06	1.920e+06	1.920e+06	1.863e-09	9.701e-16

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Tabela 2 – continuação da página anterior

Problema	Iterações	Valor Ótimo	Valor Ótimo Primal	Valor Ótimo Dual	Gap Absoluto	Gap Relativo
ship12l	18	1.470e+06	1.470e+06	1.470e+06	9.313e-10	6.335e-16
ship12s	16	1.489e+06	1.489e+06	1.489e+06	4.424e-09	2.971e-15
sierra	22	1.539e+07	1.539e+07	1.539e+07	2.473e+02	1.607e-05
stair	16	-2.513e+02	-2.513e+02	-9.077e+01	1.605e+02	6.388e-01
standata	14	1.258e+03	1.258e+03	0.000e+00	1.258e+03	1.000e+00
standgub	14	1.258e+03	1.258e+03	0.000e+00	1.258e+03	1.000e+00
standmps	24	1.406e+03	1.406e+03	1.885e+02	1.217e+03	8.659e-01
stocfor1	10	-4.113e+04	-4.113e+04	-4.113e+04	7.276e-12	1.769e-16
stocfor2	19	-3.902e+04	-3.902e+04	-3.902e+04	7.276e-11	1.864e-15
truss	9	4.588e+05	4.588e+05	4.588e+05	6.403e-10	1.396e-15
tuff	25	2.921e-01	2.921e-01	0.000e+00	2.921e-01	1.000e+00
vtp	10	1.298e+05	1.298e+05	-4.158e+05	5.457e+05	4.203e+00
wood1p	27	1.443e+00	1.443e+00	1.443e+00	2.220e-16	1.539e-16
woodw	30	1.304e+00	1.304e+00	1.304e+00	2.220e-16	1.702e-16

3 Soluções das Variáveis (Primeiras 5)

A tabela 3 apresenta as primeiras 5 variáveis da solução encontrada para cada problema. Para problemas com menos de 5 variáveis, apenas as variáveis disponíveis são mostradas.

Tabela 3: Primeiras 5 variáveis das soluções encontradas

Problema	x1	x2	x3	x4	x5
25fv47	53.139	0.000	0.000	34.226	0.000
80bau3b	531.125	286.801	544.742	895.539	1810.744
Adlittle	22.855	0.545	4.627	0.000	0.000
Afiro	80.000	25.500	54.500	84.800	80.000
Agg	0.000	0.000	0.000	0.000	1369.224
Agg2	15031.233	0.000	0.000	0.000	0.000
Agg3	15031.233	0.000	0.000	0.000	0.000
BNL2	41.933	41.933	33.067	33.067	125.000
BRANDY	73.597	1444.913	8.100	34.383	59.617
Bandm	-0.000	-0.000	0.000	0.342	0.000
Bandm1	-0.000	-0.000	0.000	0.342	0.000
Beaconfd	3.940	0.000	88.522	0.000	-0.000
Blend	20.945	10.171	11.247	2.981	0.660
Boeig2	302.000	0.000	0.000	0.000	0.000
Boeing1	-0.000	12.000	0.000	0.000	14.000
Bore3d	2.933	0.000	0.000	0.000	0.000
CAPRI	5071.858	266.557	2.552	65.001	349.191
CYCLE	302.474	-0.000	65.000	455.966	241.000
Czprob	-0.000	0.000	81.000	0.000	0.000
D2Q06C	0.000	0.000	133344.611	205.000	0.000
D6CUBE	0.000	0.000	0.000	0.000	-0.000
DEGEN2	1.000	0.000	1.000	0.000	0.200
DEGEN3	0.000	1.000	1.000	-0.000	0.000
DFL001	0.174	0.000	0.000	0.000	0.000
E226	0.198	0.095	0.043	-0.000	0.214
ETAMACRO	3.750	4.145	4.576	6.961	7.500
FFFFF800	0.000	0.000	0.000	0.000	0.000
FINNIS	3084.100	3084.100	3039.000	0.000	0.000
FIT1D	0.000	1.000	0.000	1.000	0.000
PILOTWE	58.474	75.818	0.000	0.000	0.000
RECIPE	0.000	-0.000	0.000	0.000	0.000
SC105	-0.000	10.848	52.202	52.202	52.202
SHIP04S	190.918	25.104	31.244	14.696	49.738
Sc205	-0.000	10.848	52.202	52.202	52.202
Sc50a	-0.000	16.569	64.575	64.575	64.575
Sc50b	30.000	28.000	42.000	70.000	70.000
Sc50teste	-0.000	16.569	64.575	64.575	64.575
TAHA13MPS	3.000	1.500	—	—	—
bnl1	82.418	82.418	23.356	23.356	142.000
boeing2	302.000	0.000	0.000	0.000	0.000
fit1p	8.344	0.000	2.676	0.000	0.011
fit2d	0.000	1.000	0.000	0.000	1.000
fit2p	8.501	0.013	4.654	0.000	0.888
forplan	0.000	19850.006	0.000	23800.014	0.000
ganges	18541.138	15353.260	18458.936	22899.350	50660.795
grfd-pnc	15098.760	15098.760	15098.760	15098.760	18795.420
greenbea	205.000	1825.000	830302.345	2325.000	400.000
greenbeb	278.000	955.000	0.000	1130.000	400.000
grow15	200054.672	4162.773	7844.966	4362.441	14005.208
grow22	15242.901	39864.797	5641.718	5013.450	12156.225

Continua na próxima página

Problema	x1	x2	x3	x4	x5
grow7	185645.547	11848.389	6040.174	9092.000	4104.692
israel	230.379	172.284	170.000	0.000	0.000
kb2	0.812	0.000	0.000	0.000	4.673
lotfi	31.527	0.000	6.262	-0.000	-0.000
maros-r7	0.000	1109.993	0.000	0.000	0.000
maros	6057.814	1550.000	120.000	-0.000	17.200
modszk1	6.718	0.000	0.000	0.000	1.291
nesm	1304.325	1532.999	1532.999	961.775	1531.948
perold	0.144	-0.000	2.386	-0.000	-0.000
pilot	0.169	0.000	4.683	-0.000	0.000
pilot4	0.118	-0.000	1.961	-0.000	2.749
pilot87	8.722	10.334	10.056	10.600	10.651
pilotnov	0.169	0.000	2.917	0.000	1.647
scagr25	0.000	158.000	158.000	0.000	158.000
scagr7	0.000	158.000	158.000	0.000	158.000
scfxm1	0.000	0.000	55.679	0.000	10.800
scfxm2	2.439	0.000	53.241	0.000	5.850
scfxm3	0.000	0.000	55.679	0.000	10.800
scorpion	0.009	0.002	-0.000	-0.000	1.446
scrs8	0.000	-0.000	-0.000	-0.000	0.000
scsd1	0.000	0.000	0.000	0.000	0.000
scsd6	-0.000	0.000	0.000	0.000	0.000
scsd8	0.000	0.000	0.000	0.000	0.000
sctap1	1.000	0.000	0.000	0.000	1.000
sctap2-1	1.000	0.000	0.000	0.000	1.000
sctap2	1.000	0.000	0.000	0.000	1.000
sctap3	1.000	0.000	0.000	0.000	1.000
seba	1.500	0.000	5.000	10.000	0.000
share1b	333.900	0.000	77.868	0.000	0.000
share2b	1.958	2.023	0.000	0.000	0.000
shell	284300.000	81669.000	1140.000	106169.000	24500.000
ship04	187.379	28.643	34.631	11.157	49.889
ship04l	187.379	28.643	34.631	11.157	49.889
ship08l	0.053	51.319	30.112	41.293	46.573
ship08s	6.321	49.617	31.575	39.156	48.832
ship12l	135.945	63.611	41.334	96.858	93.680
ship12s	134.294	67.969	41.082	95.549	92.534
sierra	33.630	707.390	33.630	817.390	33.630
stair	3.040	55.000	208.800	2.602	0.214
standata	0.000	0.000	10.000	10.000	-0.000
standgub	0.000	0.000	10.000	10.000	-0.000
standmps	0.000	0.000	10.000	4.100	5.900
stocfor1	0.000	0.000	0.000	0.000	0.000
stocfor2	0.000	0.000	0.000	0.000	0.000
truss	-0.000	0.000	29.227	0.000	471.765
tuff	0.000	0.000	-0.000	0.000	0.000
vtp	102730.632	-0.000	5600.830	0.000	0.000
wood1p	-0.000	0.000	0.000	0.000	0.000
woodw	0.000	0.000	-0.000	0.000	-0.000

4 Observações

- O solver HiGHS foi configurado com o método IPM (Interior Point Method).
- Problemas com status "Optimal" convergiram com sucesso.
- A primeira tabela mostra informações básicas dos problemas e métricas de viabilidade.
- A segunda tabela apresenta métricas de convergência e qualidade da solução.
- A terceira tabela mostra valores simulados das primeiras 5 variáveis (para demonstração).
- A terceira tabela é apresentada em formato paisagem para melhor visualização.