B4 6H O@ J8

Java $ rMQ$ $$?%=! <%F% #% s%0
% "% k% 4% j% :% `$ N2 D; k2=

;a L> !' @P@n @5?M

3X @R HV 9f !' 2210940027-4

;X F3 65 0w !' ;3: j >!90 65<x

Ds =P F| !' 1998 G/2 7n20 F|

N)L?4 [Bg3X M}9)3XIt >pJs3X2J

FbMF9<35

K\O@J8GO!"Java $rMQ$$$?%=!<%F%#%s%0%"%k%4%j%:%`$N2D;k2=$K$D$$$F=R$Y$k!#%=!<%F%#%s%0%"%k%4%j%:%`KO?'!9$J<oN`$,$"$j7k2L$OF1$8$@$,%=!<%HESCf$,0[$J$k!#$3$N%=!<%HESCf$rM}2r9k3H$O=EMW$G$"$k$,!"$J$+$J$+%$%a!<8rHi(k3HO:FqG$"$k!#3l$r2r7h$9k?aKESCf7P2a$rI=<($7$FM}2r$r;Y1g9k8&5f$,?J$sG-$F$$$k!#7+$7!"$^$@IT==<J,$JE@$bB?$/$^$@2~A1$NM>CO$,$"$k!#$[$HsI$N8&5f$G$O%G!<%?$NCM$,@_Dj$5lF$*$j!"<+J,$G%G!<%?$r@_DjG-$J$$!#K\8&5fGO%G!<%?$r<+J,$G@_Dj5lkh$&$K$7!"$=$N%G!<%?$r1_H7$FI=<($7;k3PE*$KM}2r$7d9$/$7$F$$$k!#

Java $O!"%"%K%a!<7%g%s$r:n@.9kKOHs>o$KJXMx$J8@8l$G!"?'!9$J%/%i%9$,MQ0U$5lF$$$k!#Java $NThread %/%i%9$rMQ$$$k3HKh$jESCf7P2a$r<B8=$7!"$^$??'IU$1$bJava $NColor %/%i%9$rMQ$$$k3HKh$j<B8=$9$k!#

L\<!

1 O8aK

8=:_!"%"%k%4%j%:%`650i$NCf$G:G$b$h$/MxMQ$5$l$k$N$,%=!<%F%#%s%0%"%k%4%j%:%`G"$k!#%=!<%F%#%s%0%"%k%4%j%:%`$O!"<oN`$bB?$/!"3lirM}2r9k;v$OBgJQ=EMW$G$"$k!#7+$7!"$3li$r9V5A$JIG!"8}F,$d!"5-=R$JIG@bL@7F$b!"$=$NM}O@$rF,NCfGM}2r9k;v$O:$FqG"$k!#$J$<$J$i!"%=!<%H%F%#%s%0%"%k%4%j%:%`$O;~4VE*$KE83+$9$k$b$N$@$+$i$G$"$k!#$9$J$o$A!"$=$l$>$l$N%=!<%F%#%s%0<jK!$K$h$C$F!"%G!<%?$NJB$Y49$($,0[$J$j!":G=*7k2L$OF1$8$K$J$k$,!"ESCf7P2a$O%=!<%H%F%#%s%0<jK!$K$h$C$F!"0[$J$k$+$i$G$"$k!#=>$C$F!"%"%k%4%j%:%`$r8+$?$@$1GO!"IN%=!<%F%#%s%0<jK!GJBY49$($7$F$$$k$+!"M}2r$7Ei$$!#8=:_!"%=!<%F%#%s%0%"%k%4%j%:%`$N2D;k2=$N8&5f$O?J$_DD$"$k$,!"$^$@$^$@IT=<J,$JE@$bB?$/!"3liN:Fq5$r40A4$K;Y1g9k$^$GKO;jCF$$$J$$!#

0lJ}!"Java $NEP>l$Khj!"%^%k%A%f!<%6%M%C%H%o!<%/%2!<%`$J$I$NBPOC@-$H$$$C$?$h$&$J$b$N$d!"%"%K%a!<%7%g%s$J$I$,<B8=$G$-$k$h$&$K$J$C$?!#K\8&5f$G$O!"$3$NJava $rMQ$$$F$3$l$i$N%=!<%F%#%s%0%"%k%4%j%:%`$NM}2r$N:Fq5$r!"2D;k2=$9k3HKhj2r>C7h$&$H9kbNG"$k!#

Java HO!"1995 G/$K!"Sun Microsystems <R$,H/I=7?8@8l$G!"8@8l;EMM$OC++NMMJ%*%V%8%'%/%H;X8~8@8l$HBgJQN`;w$7$F$$$k!#Java $,B>$N%W%m%0%i%_%s%08@8l$HBg$-$/0[$J$kE@$O!"Java $,%W%i%C%H%U%)!<%`FHN)$H$$$&3HG"$k!#%W%i%C%H%U%)!<%`FHN)$H$O!"%W%i%C%H%U%)!<%` !JPC >e$NWindows95 $dWindowsNT!"Macintosh!"UNIX!K$K4X78$J$/!"%"%W%j%1!<%7%g%s$,F0:nG-kH$$$&3HG"$k!#Java GO!"%=!<%9%l%Y%k$K;_$^i:!"%P%$%J%j%l%Y%kK*$$$F$b%W%i%C%H%U%)!<%`FHN)$G$"$k[2]!#$3$N;v$K$h$C$F!"B?$/$N0[$J$k5!<o$GF0$+$9;v$,2DG=$H$J$k!#$^$?Java $O%"%W%j%1!<%7%g%s$H%"%W%l%C%H$KJ,$+$l$F$*$j!"%"%W%j%1!<%7%g%s$O!"Java 8@8l$G=q$+$l$?:G$b0lHLE*$J%W%m%0%i%`$G!"%V%i%&%6$N7PM3$OI,MW$J$$!#0lJ}!"%"%W%l%C%H$O!"WWW 7PM3$GWeb %V%i%&%6>e$K%@%&%s%m!<%I$5lF!"<B9T5l$k%W%m%0%i%`$N;vG"$k!#$^$?!"Java GO%M%C%H%o!<%/!"%$%s%?!<%M%C%H4X78$KBP1~9k%*%V%8%'%/%H!&/%i%9$,MQ0U$5lF$$$F!"3l$r;HMQ$9k3HKhj!"%$%s%?!<%M%C%H$r2p9k$@$1$G4JC1$K%"%W%l%C%H$r8F$S=P$9$3H,G-$k!#Java $N5!G=$H7F!"<g$K!"#1. %0%i%U%#%C%/%9$NIA2h!"#2. %\%?%s!"%F%-%9%H!&U%#!<%k%I!"%A%'%C%/%\%C%/%9!"JI$NGUI ItI J$NMxMQ!"#3. ;~4V5!G=$NMxMQ$JI,5s2ilk[5]!#

K\8&5fGO!"%=!<%F%#%s%0%"%k%4%j%:%`$rM}2r$7d9$/$9k?$a!"2D;k2=$9k3HrL\E*H9$k!#<B8=J}K!$H7F!"Java $rMQ$$!"$=$liN5!G=$rM-8z$KMxMQ7F!"%G!<%?CM$r1_$ND>7BH7FJai$(!"$=lrJB$Y49$(k3HKhj!";k3PE*$KM}2r$7d9$/$9$k!#$3lO!"Java $N5!G=$N#1DG$"$k!"%F%-%9%H!&U%#!<%k%I$rMQ$$!"$=$3$+$i%G!<%?$rF~NO$7!"$=$N%G!<%?$r1_$ND>7BH7$F9M$(!"$=$N1_$r%=!<%H$9kh$&$K9k!#$^$?!"%=!<%H:Q%G!<%?HL%=!<%H%G!<%?$r?'IU$1$9$k3HKh$j!";k3PE*$KJ,$+$jd9$$$h$&$K9k!#3liN;v

$r<B8=$9k?aK=EMWHJCF$/$kN,!"D>7B$N@)8f$H!"%=!<%H$N7P2a$rINh&$KI=$9$+$H$$$&E@G"$k!#D>7B$N@)8f$O!"%G!<%?CM$KhC$F>l9gJ,$1$7!"%=!<%H$N7P2aI=<($O1_$N:BI8$rB.EY$r@)8B7J$,$iJQ2=5;J,$i!":FIA2h$9k3HKhj<B8=9k!#$^$?!"3lir%"%W%l%C%HH7$F<B8=$9k3HKhj!"%$%s%?!<%M%C%H>e$G<B9TG-kh$&$K9k!#

K\O@J8GO!"2 >O$GJava $N4pK\E*$J@-<AH=$N9=B$!"3 >O$G%G!<%?$rINh&K7$F2D;k2=$9k+!"$^$?!"$=$l$K4X$9$k@)8f!"4 >O$G$O!"%P%V%k%=!<%H!"%/%$%C%/%=!<%H$r2D;k2=$7!"$=$N<B9T$HI>2A$r9T$$!"5 >OGO!"K\O@J8$N7k8l$H:#8e$N2]Bj$r<($9!#

2 Java $N4pK\9=B$

2.1 API(Application Programming Interface) %Q%C%1!<%8

API %Q%C%1!<%8NCfGDj5A5l$F$$$k?’!9$J%Q%C%1!<%8$r;HMQ7F!"%0%i%U%#%C%/%9$NIA2h!"%\%?%s!"%F%-%9%H!&U%#!<%k%I!"%A%’%C%/%\%C%/%9!"JI$NGUI ItIJ$NMxMQJI$,<B8=$G$-$kh&KJC?$j!"B>$K$b?’!9$J5!G=$r<B8=$G$-$kh&KJ$k!#API %Q%C%1!<%8$O7<oN`$KJ,N`G-!"5iK=liNCfKJ#?t$N%/%i%9$,Dj5A5l$F$$$k!#I=1 K=$N7<oN`$N5!G=$r<($9!#

I=1: java %Q%C%1!<%8H=$N5!G=

%Q%C%1!<%8	5!G=
java.applet	%"%W%l%C%H4X78
java.awt	IA2h!"GUI ItIJ4X78!"Graphics,Image,Button JI$N%/%i%9$,4^$^$l$k!#
java.awt.image	%$%a!<%8=hM}4X78!"ImageFilter,ImageObserver JI$N%/%i%9$,4^$^$l$k!#
java.io	%U%!%$%kF~=PNO4X78!"InputStream,RandomAccessFile JI$N%/%i%9$,4^$^$l$k!#
java.lang	7?!"%9%l%C%I4X78!"Thread,Integer JI$N%/%i%9$,4^$^$l$k!#
java.net	%M%C%H%o!<%/4X78!"InetAddress!"Socket JI$N%/%i%9$,4^$^$l$k!#
java.util	F|IUJI$N%f!<%F%#%j%F%#4X78!"Date!"Random JI$N%/%i%9$,4^$^$l$k!#

3liN%Q%C%1!<%8$r;HMQ$7J1lP!"java $N5!G=$r==J,$KH/4x$G$-$J$$!#J<Ji!"java GO!"C10l7Q>5$7$+J/!"7Q>5$7$?%/%i%9!"$^$?$=$N%9!<%Q!<%/%i%9$GDj5A$5lF$$$k%a%=%C%I$O;HMQ2DG=$G$"$k$,!"$=$NH?LL!"%/%i%9$,@)8B5lkH$$$&7gE@$,$"$k!#$=3G!"3N!V%Q%C%1!<%8$+$i$N;2>H!W$rMQ$$$?$j!"$5iK!V%$%s%?!<%U%’!<%9$N<BAu!W$H$$$&35G0$rMQ$$$k3HKhCF<B8=G-$k!#%$%s%?!<%U%’!<%9HO!"7Q>5$7$F$$$J$$$B>$N%/%i%9$r;HMQG-kh$&$K9k%F%s%W%l!<%H!J7?OH!KN3HG$"$k[5]!#

2.1.1 %0%i%U%#%C%/%94X78%/%i%9%Q%C%1!<%8(java.awt)

awt $O!"<g$K!"<!NMMJ5!G=$r%f!<%6$KDs6!9k$?$a$N!"%Q%C%1!<%8$G$"$k!#

- GUI ItIJ!"%\%?%s!"%A%g%$%9!"%A%'%C%/%\%C%/%9!"%F%-%9%HF~NOJI
- %$%Y%s%H%O%s%I%j%s%/%7%9%F%`!"%f!<%6$,%/%j%C%/$J$I$NF0:n$r9T$C$?$H$-$K %W%m%0%i%`$,H?1~$7$F=hM}$r9T$&!#
- %0%i%U%#%C%/%9$N;Y1g
- %3%s%F%J$N<B8=
- %l%$%"%&%H%^%M!<%8%c5!G=!"$3lOGUI ItIJ$r<+M3$KG[CVG-kh$&$K;Y1g9k!#

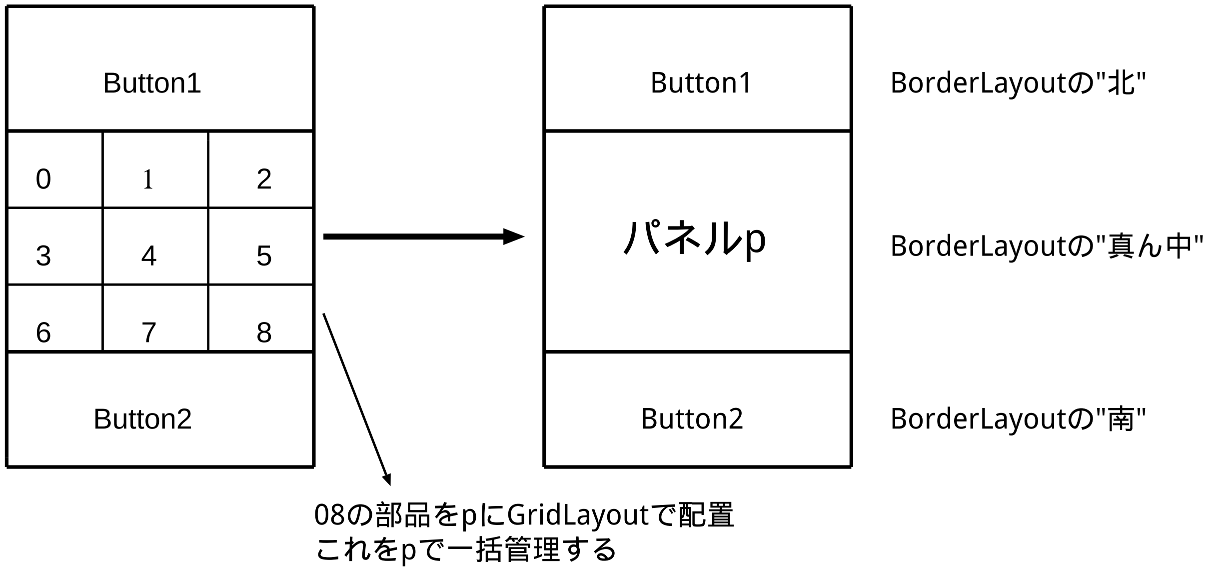
awt $NGUI 5!G=$H7F$O!"$^$:awt %&%$%s%I%&$,#1HV3OB&$KB8:_7F!"$=$NCf$K%\%?%s$d%A%'%C%/%\%C%/%9!"%F%-%9%H!&U%#!<%k%IJI$NItIJ$,F~$l;R9=B$$KJCFG$-$F$$$k!#<B:]$KL\$K8+$($kNO3liNItIJG"k,!"3liNItIJr^Hak?aK%3%s%F%J$H$$$&ItIJ$bB8:_$7$F$$$k!#

%$%Y%s%H%O%s%I%j%s%/%7%9%F%`$O!"%^%&%9%/%j%C%/$d%I%i%C%0$J$I$NA`:n$G%$%a!<%82hA|$r0\F0$5$;$?jG$-$k5!G=G"$k!#

%0%i%U%#%C%/%9$N5!G=$H7FD>@~$d!"1_!"BJ1_!"H>1_$JIrIA2h9k%a%=%C%I$,Ds6!$5lF$$$k!#$^$?!"3D JI$N2hA|$r:n@.9k$?$a$N%a%=%C%I$bawt GOD j5A5l$F$$$k!#

<!$K!"%l%$%"%&%H%^%M!<%8%c5!G=O=l>lNItIJrINh$&$KG[CV9k$+$r;Y1g9k$?$aNbNG$"$k!#4pK\E*$Kawt KO!"FlowLayout!"GridLayout!"BorderLayout!"CardLayout!"GridBagLayout $N5 D,B8:_$7!"$3li$r%Q%M%k$rMQ$$$k3HKhCF!"hjI}9-$$G[CV$,2DG=$HJk!#%Q%M%kHO$$$/D+$NItIJ$r1 DH7FJai(k?aN5!G=G"$k[5]!#!J^1 $K<($9!K

1. FlowLayout !&&&&86y$+$i=g!9$KItIJ$rG[CV$7!"0lGU$KJl$P<!$N9T$K0\F0$9$k!#
2. GridLayout !&&&&FItIJ$r3J;R>u$KG[CV$7!"9T!"Ns$r;XDj9k3H$,$G$-$k!#
3. BorderLayout !&&&?sCfrCf?4K7$F!"”El”!"”@>”!"”Fn”!"”KL”$KItIJ$rG[CV9k!#
4. CardLayout !&&&&ItIJ$r=E$M$FG[CV$7!"next!"previous %a%=%C%I$rMQ$$$FA08e$N%+!<%I$ra/kh$&$KI=<(9k!#
5. GridBagLayout !&&&3l$OItIJ$NBg$-$5$rJQ2=$5$;$F!"GridLayout $NG[CV$r9T$&



?^1: %Q%M%k$rMQ$$$?G[CV

2.1.2 %"%W%l%C%H4XT8%/%i%9%Q%C%1!<%8 !Jjava.apple)

3N%Q%C%1!<%8KOjava $G%"%W%l%C%H$r:n@.9k;~$K;HMQ$9$k%/%i%9$d!"%V%i%&%6$d%" %W%l%C%H%S%e!<%o$JI+$i!">pJs$r<hF@9k%/%i%9!"%*!<%G%#%*$r:F@8$7$?$j!"Dd;_5; $k%/%i%9$,Dj5A5l$F$$$k!#%"%W%l%C%H%S%e!<%oHO!"HTML %U%!%$%k$+$i8F$S=P5l$k %"%W%l%C%H$N<B9T7k2LN_$r3NG'$G$-!"HTML $N<B9T7k2L$O3NG'G-$J$$4D6-N3HG$" $k!#<g$K%"%W%l%C%H3+H/CJ3,$G;HMQ$9$k!#

2.1.3 %9%l%C%I!&7?4XT8%/%i%9%Q%C%1!<%8 !Jjava.lang)

3N%Q%C%1!<%8$O!"java $N%W%m%0%i%`$N4pK\MWAG$H$J$k%/%i%9$rDs6!9k!#java %$%s%?!< %W%j%?$djava %3%s%Q%$%i$JIN5!G=$r<B8=$9k?aN%/%i%9$b4^$^lk!#String!"Imteger!" Thread JI$N:G$bMxMQ5l$k%/%i%9$b3NCf$K4^$^lk!#String %/%i%9$OJ8;zNs$N%G!<%? $r07$&$?$a$N5!G=$rDs6!9k!#$^$?!"Integer %/%i%9$O@0?t7?$N%G!<%?$r07$&$?$a$N%/%i%9 G"$k!#Thread %/%i%9$O!"java $N%9%l%C%I5!G=$r<B8=9k%/%i%9G"$k[2]!#

(1) %^%k%A%9%l%C%I5!G=

IaDL!"%W%m%0%i%`$r<B9T$9$k$H!"=g<!F0:n$,?J$`$,!"J#?t$N%9%l%C%I$rMQ$$$l$P!"%W%m%0 %i%`$NCf$G!"3F%9%l%C%I$,<+J,$NC4Ev$NItJ,$r<B9T$9lP$h$$!#%^%k%A%9%l%C%I5!G=$rMQ $$$l$P!"#1$D$N%Z!<%8>e$GJ#?t$N%"%W%l%C%H$r5/F0$5$;k3H,G-$k[4]!#

(2) %9%l%C%I%*%V%8%'%/%H$N:n@.K!

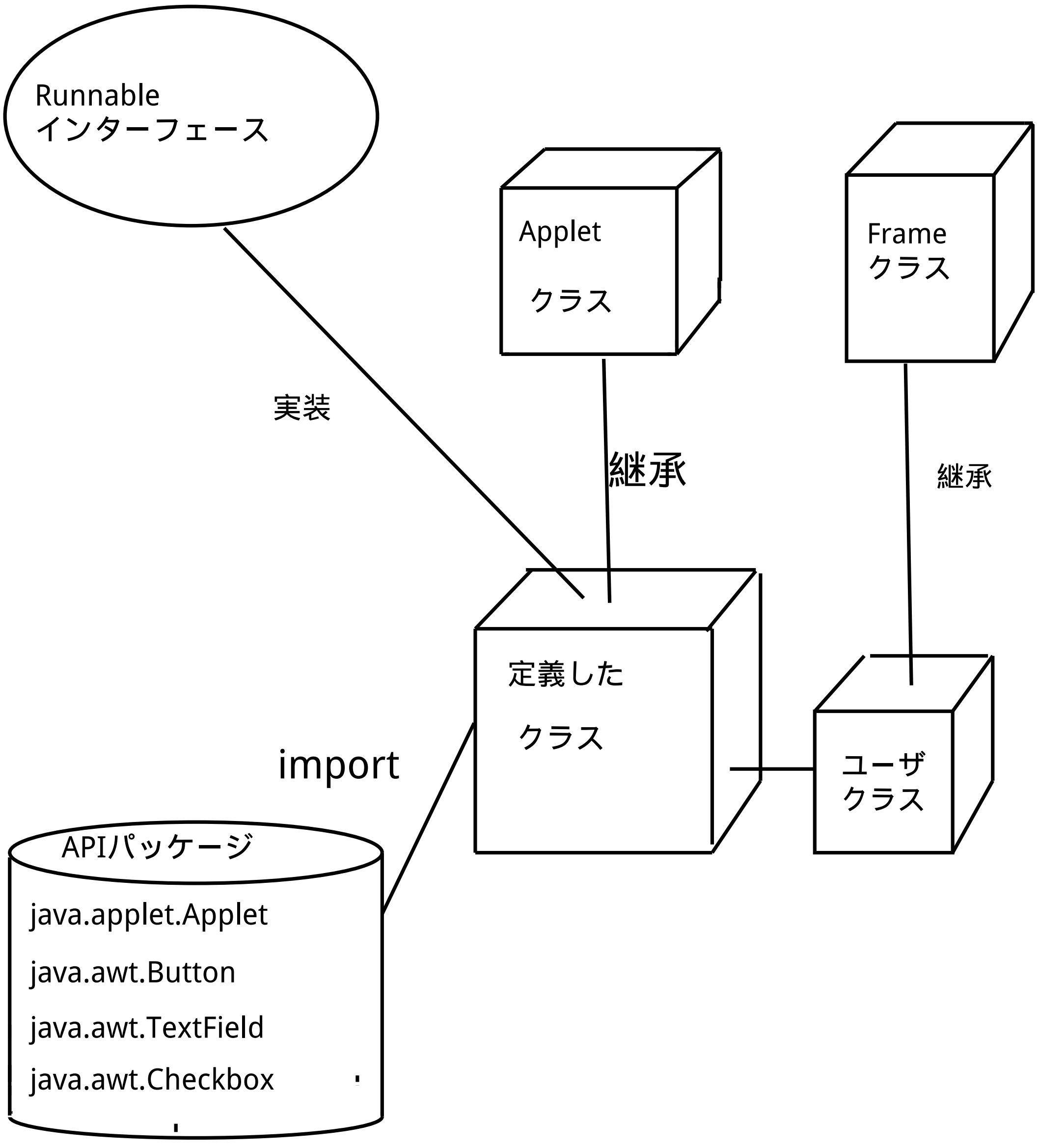
%9%l%C%I$r@8@.$9$kJ}K!$H7F!"Thread %/%i%9$rMQ$$$?%5%V%/%i%92=$H Runnable %$%s%?!<%U%'!<%9$rMQ$$$kJ}K!$,$"$k!#$7$+$7!"%"%W%l%C%HH7$F:n@.$9kJ$i Runnable %$%s%?!<%U%'!<%9$rMQ$$$?J}K!$G@8@.$9$k!#Runnable %$%s%?!<%U%'!<%9HO!"%9%l%C%I5!G=$r<B8=$5$;$k$?$a$N%$%s%?!<%U%'!<%9N3HG!"Thread %/%i%9$GDj5A$5lF$$$k%a%=%C%I A4Fr;HMQ9k3HOG$-$J$$!Runnable %$%s%?!<%U%'!<%9$GDj5A5l$F$$$kNOrun %a%=%C%IN_!K#7+$7!"%9%l%C%I$rJ];}9k$?$a$N%$%s%9%?%s%9JQ?t$r2C$(!"$=$l$rMQ$$$l$PRunnable %$%s%?!<%U%'!<%9GbThread %/%i%9$N%a%=%C%I$r;HMQG-kh$&$KJk[4]!#

(3) %^%k%A%9%l%C%I5!G=$N<B8=J}K!

1. %"%W%l%C%H%/%i%9$rDj5A$9$k:]$K Runnable %$%s%?!<%U%'!<%9$r<BAu9k!#
2. %a%=%C%I start() $r!"%9%l%C%I@8@.$7!"<B9T$r3+;O$r9k!#
3. %a%=%C%I run() $r@8@.$7$F!"$=NCfG%"%W%l%C%H$NF0:n$r5-=R9k!#
4. %9%l%C%I$rJ];}$9k?aN%$%s%9%?%s%9JQ?t$rDj5A9k!#

2.2 API %Q%C%1!<%8$+$i$N7Q>5

API %Q%C%1!<%8$r;HMQ$9k?aK!"imoport J8$rMQ$$$k3HKh$j<B8=$G$-$kh&K9$k!#$^$?K\8&5f$G$O%"%W%l%C%H$H7F java $N%^%k%A%9%l%C%I5!G=$r;HMQ7F$$$k$?$a!"Runnable %$%s%?!<%U%'!<%9$r<BAu9kI,MW$,$"$k!#?^2 $O!"$=$NMM;R$r<(7F$$$k!#$^$?!"Frame %/%i%9$rMQ$$$k$,!"Java GOC10l7Q>5$7$+G'ailJ$$$?$a!"Dj5A$7$?%/%i%9$N%f!<%6%/%i%9$r@8@.$7!"$=$N%/%i%9$K Frame %/%i%9$r7Q>5$5$;!"$=$N%f!<%6%/%i%9$rDj5A$7$?%/%i%9$+$i8F$S=P$9!#

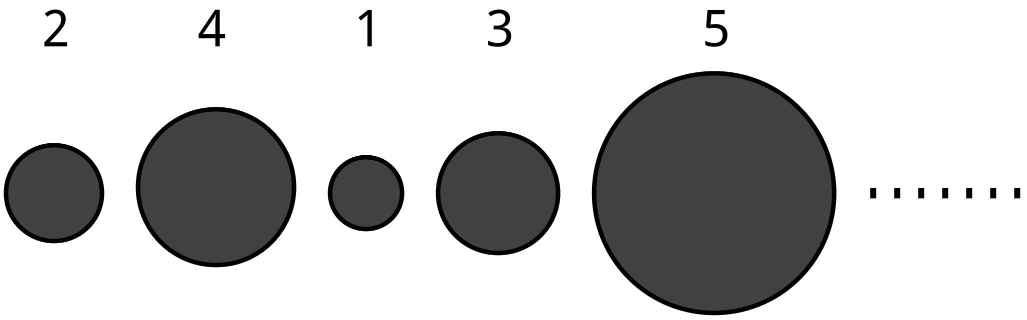


?^2: %/%i%99=@.?^$HRunnable %$%s%?!<%U%'!<%9$N<BAu

3 %G!<%?$N2D;k2=

3.1 %G!<%?CM$ND>7BI=<(

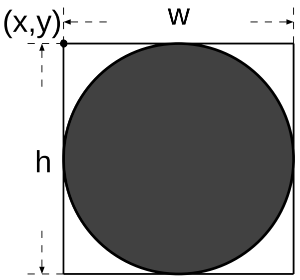
%=!<%F%#%s%0%"%k%4%j%:%`$N2D;k2=$r9T$&:]$K!"$?$@C1$K%G!<%?$,F~$l49$ok@1G$O;k3PE*$KM}2r7E$i$$!#$=$3$G%G!<%?$NCM$rl_$ND>7BH7$FI=<($7!"$=$Nl_$N>e$K$=$N%G!<%?CM$rI=<($9kh$&$K9k!#



?^3: %G!<%?$ND>7BI=<(

(1) I=<(J}K!

1_$rI=<($9k?aK$O!"javaAPI %Q%C%1!<%8$Nawt $NGraphics %/%i%9$r;HMQ7F!"$=$NCf$GDj5A$5lF$$$kfillOval $H$$$&%a%=%C%I$rMQ$$$k!#3N%a%=%C%I$NDj5A$O!";OE@!Jx,y!K"I}w!"9b$5h $N;M3Q7A$K@\$9$k1_$NI=<(G"kN$G!"$3$NI}$H9b5rI=$9w,h $r%G!<%?CM$K9k3HKh$j%G!<%?CM$ND>7BI=<($,<B8=$G$-$k!#$^$?!"%G!<%?$,Ii$NCMNH$-$O!"drawOval %a%=%C%I$rMQ$$EIjDY5lF$$$J$$1_$rI=<($9$k!#I=<(7A<0$OfillOval %a%=%C%I$HF1$8G"$k[5]!#



?^4: fillOval $N1_I=<(

(2) 1_$NCf?4$Ny :BI8$NE}0l

3.1 $G=R$Y$?$h$&$K!"fillOval %a%=%C%I$N7A<0$G$O%G!<%?$NCMKhCF1_$NCf?4$,%P%i%P%i KJ$k!#$=3G1_$NCf?4y :BI8$rE}0l7F!"M}2r7d$9$$$h$&$K9k!#

y= 100-(A/2) (1) A:%G!<%?CM

>e<0Kh$j1_$NCf?4$Ny :BI8$,E}0l5l$k!#

(3) %G!<%?CM$NI=<(

%F%-%9%H%U%#!<%k%I$+$iF~NO7?%G!<%?CM$r!"javaAPI %Q%C%1!<%8$Nlang $GDj5A$5lF$$ $kdrawString %a%=%C%I$rMQ$$$FI=<(9k!#$?$@$7!"%F%-%9%H%U%#!<%k%IF~NO$N>l9g!"%G!< %?CM$rI=<(7h$&$H7Fb&$^$/$$$+$J$$!#3N2r7hK!$O3.4 $G=R$Y$k!#

(4) Graphics %*%V%8%'%/%H$N<hF@

Graphics %*%V%8%'%/%HHO!":G=*E*$K@~!"?^7A!"%F%-%9%H$JIrIA2h9kBP>]G"$k!#$D $^$j!"Graphics %*%V%8%'%/%H$r<hF@$7$J$$$H@~$d?^7A$JIOIA2h5l$J$$!#3l$r<hF@$9 $k<jCJ$H7F:G$b0lHLE*$JN,!"A4FNGUI ItIJ$d!"2hA|!"?^7A$r4^$`Graphics %*%V%8%' %/%H$rL@<(E*$K<hF@$9k3HNG-$k!"getGraphics %a%=%C%I$rMQ$$$?J}K!G"$k!#$3$l $OjavaAPI $Nawt $GDj5A$5lF$$$k%a%=%C%IG"$k!#

3.2 %=!<%H:Q%G!<%?$N?'IU$1

%=!<%H:Q%G!<%?$N?'IU$1Kh$j!"%=!<%H$5l?%G!<%?HL%=!<%H$N%G!<%?$r;k3PE*$KM}2r$7d9$$$h$&$K9k!#

(1)awt $NColor %/%i%9$rMQ$$$??'IU$1

java GO?'$r%9%/%j!<%s$KI=<(9k3H$,$G$-!"awt %Q%C%1!<%8$NColor %/%i%9$rMQ$$$k 3HKh$j<B8=$G$-$k!#java $GMQ$$$ilk4pK\$N?'%b%G%k$O!"%3%s%T%e!<%?6H3&$GI aDL$K MQ$$$ilF$$$kbNG"$k!#?'$O!"@V!"NP!"@D$NMWAG$+iJ$j!"$=l>lNL@k5$rbyte CM$KhjI=8=9k!#byte CM$NHO0O$O0 $+$i255 $^$G$G!"0 $,:G$b0E$/!"255 $,:G$bL@$k$$!# 7+$7!"$3$N3 <oN`$N?'$N3,D4$r$$$A$$$A;XDj9kNOITJXG"$k!#$3$N%/%i%9$K$O!"$h $/;H$&?'KD$$$F$O!"Color %/%i%9$N%/%i%9JQ?t$,MQ0U$5lF$$$k[5] !J=2!K#

(2)setColor %a%=%C%I$rMQ$$$??'IU$1

3N%a%=%C%I$rMQ$$$k3HKh$j!"?'IU$1$r<B8=$9$k!#

g.setColor !0Jz?t!K

I=2 $N%/%i%9JQ?t$r0z?tH9lP$=$NJQ?t$NI=$9?'$rI=<($7F/lk$,!"<+J,$G?'$r@_Dj$7$?$$>l9g$O!"0z?t$K<+J,$GDj5A$7$?%/%i%9JQ?t$rMQ$$$k!#

```
Color c            /* <+J,$GDj5A$9$k%/%i%9JQ?t$r@k8@ */
c= new Color(r,g,b) /* @V!"NP!"@D$NCM$r0 $+$i255 $NHO0O$G@_Dj */
  !&
  !&
setColor(c)        /*Dj5A$7$?%/%i%9JQ?t$r0z?t$H$9$k*/
```

I=2: %/%i%9JQ?t$HI=<(?'

%/%i%9JQ?t	I=<(?'	%/%i%9JQ?t	I=<(?'
Color.white	Gr	Color.blue	@D
Color.black	9u	Color.yellow	2+?'
Color.lightGray	L@$k$$3%?'	Color.magenta	;g
Color.gray	3%?'	Color.cyan	?e?'
Color.darkGray	0E$$3%?'	Color.pink	%T%s%/
Color.red	@V	Color.orange	%*%l%s%8
Color.green	NP		

(3) GX7J$N?'IU$1

%0%i%U%#%C%/%9 !&*%V%8%'%/%H$N?'IU$1$,$G$-$kNHF1MM$K!"GX7J?'$b<+J,$G@_Dj$9k3H,G-$k!#$=$N<jK!$H7F$O!"getBackground %a%=%C%I$rMQ$$$k!#3N%a%=%C%I$b0z?t$H7F!"I=2 $N%/%i%9JQ?t!"$b7/$O<+J,$GDj5A7?%/%i%9JQ?t$rMQ$$$l$P?'IU$1$,$G$-$k!#

(4) %=!<%H:Q%G!<%?$N?'IU$1

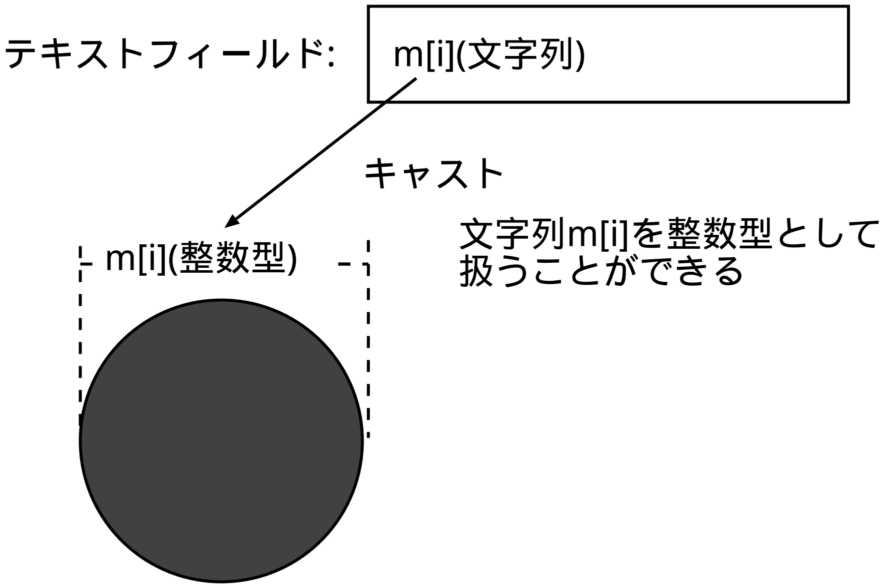
%=!<%H5l$?%G!<%?$r?'IU$1$9$k!#%P%V%k%=!<%H$G$O:G8e$KF~$l49$($?>l=j$h$j:8$N1_$N?'$rJQ2=5;$k!#$^$?!"%/%$%C%/%=!<%HGO%=!<%H$,=*N;$7$?;~E@$G?'$rJQ2=$5$;$k!#

3.3 %-%c%9%H

K\8&5f$N%G!<%?F~NOIt$G$"$k!"%F%-%9%H%U%#!<%k%I$O%G!<%?$rJ8;zNsH7$F<u$1HkNG%G!<%?$rJ8;zNs$H7F07$&$JiP!"$=$N$^$^;HMQG-k,!"@0?t7?H7$F07$$$?$$>l9g%-%c%9%H!6J/@)7?JQ49!K9kI,MW$,$"$k!#

(1) parseInt %a%=%C%I

3N%a%=%C%I$OjavaAPI %Q%C%1!<%8$Nlang $NInteger %/%i%9$GDj5A5l$F$$$k%a%=%C%I$G!"$3lOJ8;zNs$r@0?t7?$KJQ49$9$k5!G=rb$D!#K\8&5f$G$O1_$ND>7BH7$F%F%-%9%H%U%#!<%k%I$+$i%G!<%?$rFI$_9~$_$?$$$?$a!"$3$N%a%=%C%I$r;HMQ9k3H$,I,MW$G$"$k[5]!#



?^5: %-%c%9%H

(2) toString %a%=%C%I

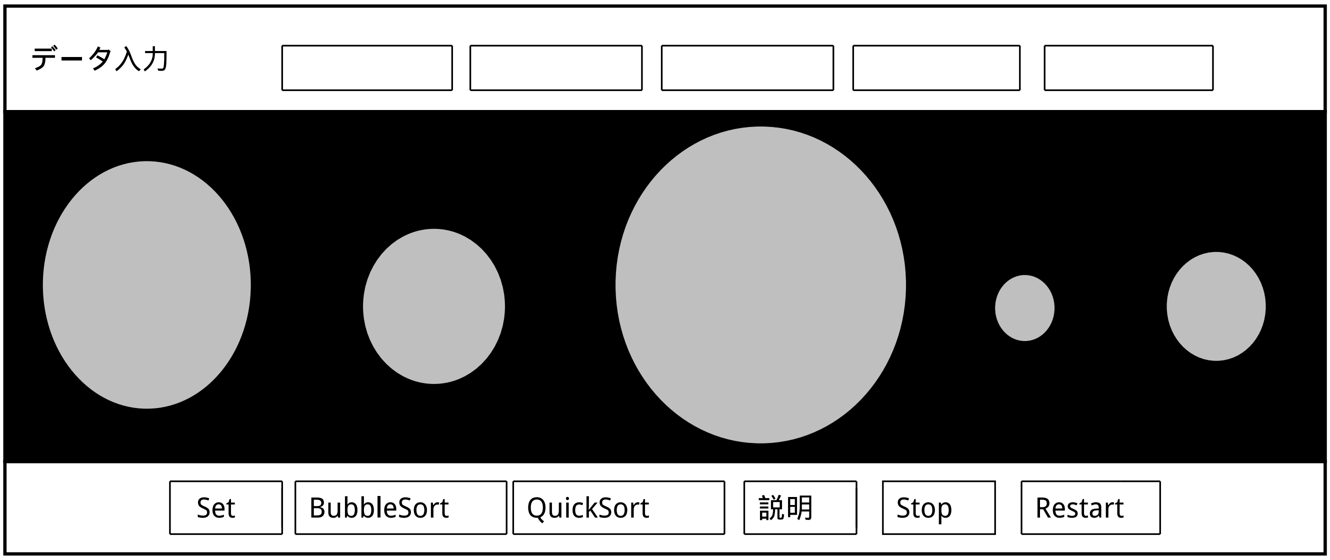
3N%a%=%C%I$bjavaAPI %Q%C%1!<%8$Nlang $NInteger %/%i%9$GDj5A5l$F$$$k%a%=%C%I$G!"parseInt %a%=%C%I$H$O5U$K@0?t7?$rJ8;zNs7?$KJQ49$9$k[5]!#

Nc$($P!"

Integer.toString(123) !"&&&#1#2#3”

$O!"10 ?J?t$N123 $OJ8;zNs$N”123” $KJQ49$5lk!#

3.4 %$%s%?!<%U%'!<%9It$N5!G=$HH=JL

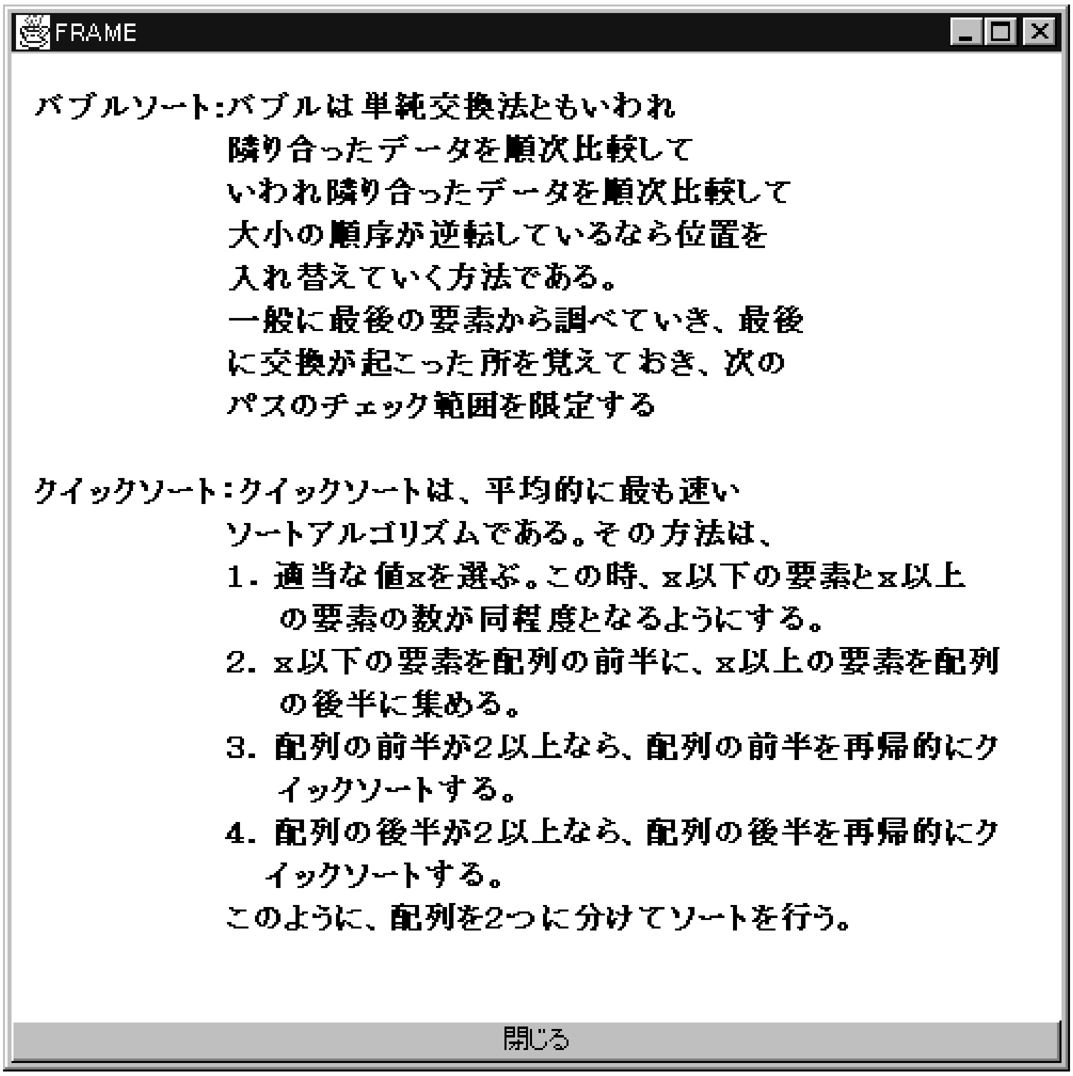


?^6: %$%s%?!<%U%'!<%9It

(1) ItIJ$N5!G=

- ” %F%-%9%H%U%#!<%k%I” $K%G!<%?CM$rF~NO9k!#
- ”Set” %\%?%s$r2!$9$H%F%-%9%H%U%#!<%k%I$+$iF~NO$5l?%G!<%?CM$r%-%c%9%H$7!"$=$NCM$r1_$ND>7BH7$FI=<($9$k!#
- ”BubbleSort” %\%?%s$r2!$9$H%P%V%k%=!<%H$r3+;O$7!"$=$N7P2a$rIA2h9k!#
- ”QuickSort” %\%?%s$r2!$9$H%/%$%C%/%=!<%H$r3+;O$7!"$=$N7P2a$rIA2h$9$k!#
- ” @bL@” %\%?%s$r2!$9$H?7$7$$%U%l!<%`$,3+$+$l!"%P%V%k%=!<%H$H%/%$%C%/%=!<%H$N%"%k%4%j%:%`$,:\$C$F$$$k!#!J?^7!K
- ”Stop” %\%?%s$r2!$9$H%=!<%H$N7P2aESCf$GDd;_$9$k!#
- ”Restart” %\%?%s$r2!$9$HDd;_$7$?>uBV$+$i:F%9%?!<%H$9$k!#

%"%W%l%C%H$K1<dN`$NItIJ$@$1$G$"$l$P!"H=JL$9$kI,MW$O$J$$$,!"$3$N%$%s%?!<%U%'!<%9J#?t$N<dN`$NItIJ$,B8:_$9$k>l9g!"instanceof 1i;;R$rMQ$$$kI,MW$,$"$k!#$^$?!"instanceof 1i;;R$O%-%c%9%H$,@.8y$7$F$$$k$+$r%A%'%C%/9k[5]!#



バブルソート:バブルは単純交換法ともいわれ
隣り合ったデータを順次比較して
いわれ隣り合ったデータを順次比較して
大小の順序が逆転しているなら位置を
入れ替えていく方法である。
一般に最後の要素から調べていき、最後
に交換が起こった所を覚えておき、次の
パスのチェック範囲を限定する

クイックソート:クイックソートは、平均的に最も速い
ソートアルゴリズムである。その方法は、
1. 適当な値xを選ぶ。この時、x以下の要素とx以上
の要素の数が同程度となるようにする。
2. x以下の要素を配列の前半に、x以上の要素を配列
の後半に集める。
3. 配列の前半が2以上なら、配列の前半を再帰的にク
イックソートする。
4. 配列の後半が2以上なら、配列の後半を再帰的にク
イックソートする。
このように、配列を2つに分けてソートを行う。

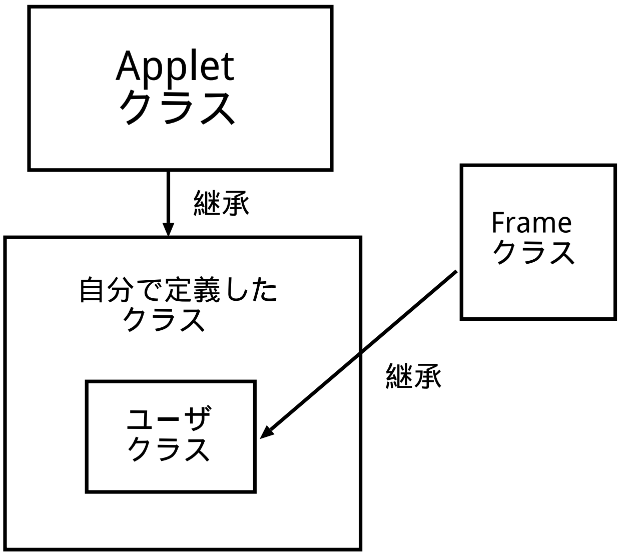
?^7: @bL@$r:\$;$?%U%l!<%`

(2) A`:n<j=g

:G=iK^$:%G!<%?F~NOIt$K100 $+$i100 $^$G$N@0?t$rF~NO9k!#<!$K%P%V%k%=!<%H$+!"%/%$%C%/%=!<%H$rA*Br$7%=!<%H$r3+;O5;$k!#ESCf$G%=!<%H$rCfCG$7$?$1lPDd;_rr2!$7!"$=3+$i%9%?!<%H$7$?$1lPRestart $r2!$9!#$^$?!"JdB-@bL@$,8+$?1l$P@bL@%\%?%s$r2!$7!"N>%=!<%H$N@bL@$,:\$C$?%U%l!<%`$rFI$`!#

(3) ?7$7$$%U%l!<%`$N@8@.

%"%W%l%C%H$+$i?7$7$$%U%l!<%`$r@8@.$7$?$$>l9g!"javaAPI %Q%C%1!<%8$Nawt $GDj5A$5lF$$$kFram %/%i%9$r7Q>5$9kI,MW,$"$k!#7+$7K\8&5f$N%"%W%l%C%H$OApplet %/%i%9$r7Q>5$7$F$$$k$?$a!"3lOG$-$J$$!#$=$3$G!"<+J,$GDj5A7?%/%i%9$N%f!<%6%/%i%9$r:n@.$7!"$3$N%/%i%9$KFrame %/%i%9$r7Q>5$5$;!"<+J,$GDj5A7?%/%i%9$+$i%f!<%6%/%i%9$r8F$S=P$9!#$?$@C1$K%U%l!<%`$r@8@.$9$k$@$1$J$iFrame %/%i%9$r7Q>5$9$kI,MW$O$J$$$,!"$=$N%U%l!<%`$G2?$+=hM}$r9T$&>l9g$O%f!<%6%/%i%9$+$i7Q>5$5$;$k!#



?^8: Dj5A7?%/%i%9$H%f!<%6%/%i%9$N4XO"

(4) ItIJ$N%l%$%"%&%H

%$%s%?!<%U%'!<%9It$NItIJ$NG[CV$O!"%Q%M%k%/%i%9$rMQ$$$F!"%G!<%?F~NOIt!"%\%?%s$,FlowLayout!"A4BN$OBorderLayout H7$F$$$k!#

3.5 ESCf7P2a$NI=<(

Java $N%9%l%C%I5!G=$rMQ$$$F%=!<%H5l$k7P2a$rI=<(9k!#

(1) %"%W%l%C%H$N99?7

%F%-%9%H%U%#!<%k%I$+$i$NF~NOCM$r49$($?$$$H$-$K!"A0$N%G!<%?$N1_$,:o=|$5$l!"?7$7$$1_rIA/h&K7$?!#$3$N;~MQ$$$kN,!"repaint %a%C%=%IG"k,!"K\Mh!"repaint %a%=%C%I$r8F$S=P9H!"repaint %a%=%C%I$Oupdate %a%=%C%I$r8F$S=P$7$F!"update $Opaint %a%=%C%I$r8F$S=P$9!#repaint %a%=%C%I$NDj5A$O!":FIA2h9k$H$$$&0UL#G"k,!">\$7$/=R$YkH!"$$$C$?$s!"IA2h5l$?$bNr>C7F!"paint %a%=%C%I$r8F$S=P9H$$$&3HKJ$k!#

?^9: update %a%=%C%I$Hpaint %a%=%C%I$H$N4X78

(2) Thread %/%i%9

javaAPI %Q%C%1!<%8$Nlang $GDj5A$5lF$$$k Thread %/%i%9$rMQ$$$k3HKh$j!"%9%l%C%I$N<B9T$rDd;_$9k3H,G-$k!#$=$NJ}K!$H7F$O!"Thread %/%i%9$GDj5A5l$F$$$k sleep %a%=%C%I$rMQ$$$k3HKh$j<B8=$G$-!"sleep %a%=%C%I$K0z?t$rMQ$$!"$=$N0z?t$N4V!"%9%l%C%I$rDd;_9k!#0z?t$O%_%jIC10L$G$"$k[2]!#

(3) %G!<%?CM8r49;~$NIA2h

%9%l%C%I$,%G!<%?$rHf3S7F!"F~$l49$($k;~$Ksleep %a%=%C%I$rMQ$$$Fdl$P!"0l5$$K%=!<%H5l$?7k2L$,IA2h5l$:!"%G!<%?$rHf3S9k$?$S$NIA2h$,$&$^$/I=8=$G$-$k!#

(4) %"%W%l%C%H$NDd;_$H:F3+

%$%s%?!<%U%'!<%9It$N”Stop” %\%?%s$r2!$;$P!"%=!<%H$NESCfGbDd;_9kh&K7$?$,!"3l$r<B8=$9k?aK!"%^%k%A%9%l%C%I5!G=$rMQ$$$k!#%9%l%C%I$,9T$C$F$$$k=hM}$r!"javaAPI%Q%C%1!<%8$NThread %/%i%9$GDj5A$5lF$$$ksuspend %a%=%C%I$rMQ$$$k3HKh$j!"0l;~Dd;_$9k3H,G-$k!#$^$?$=$NDd;_$7$?>uBV$+$i%9%l%C%I$r:F3+9k%a%=%C%I$,!"resume %a%=%C%I$G$"$k!#resume %a%=%C%I$O%9%l%C%I$N=hM}$,$I3^$G9T$C$?$+$r5-21$7F*$-!"$=3+$i%9%l%C%I$r3+;O9k!#

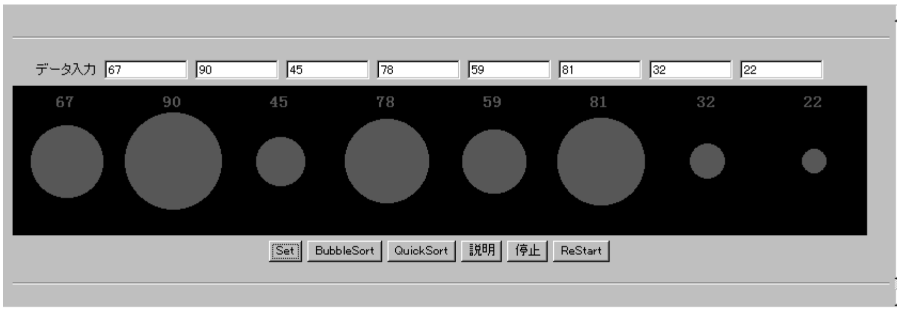
(5) %9%l%C%I$N=hM}FbMF

K\8&5fGO%G!<%?$N8r49$HIA2h$O%9%l%C%I$K=hM}5;$F$$$k!#6qBNE*KO!"%P%V%k%=!<%H$H%/%$%C%/%=!<%H$N8r49$HIA2h$r1 DN%9%l%C%I$G9T$$!"$=$l$>$l$N=hM}FbMF$O0[JkNG!"%U%i%0$rMQ$$$FH=JL$7!"%9%l%C%I$N=hM}9TCF$$$k!#7+$7!"ESCf$G%=!<%H$rCfCG$9kH$-$Ksuspend %a%=%C%I$rMQ$$$k$H%9%l%C%I$,Dd;_9k$?$a!"IA2h$r9T$o$:2?$bI=<(5l$J$$!#$=$3$G!"suspend %a%=%C%I$r8F$S=P$9$HF1;~$K!"paint %a%=%C%I$r8F$S=P$9I,MW$,$"$k!#

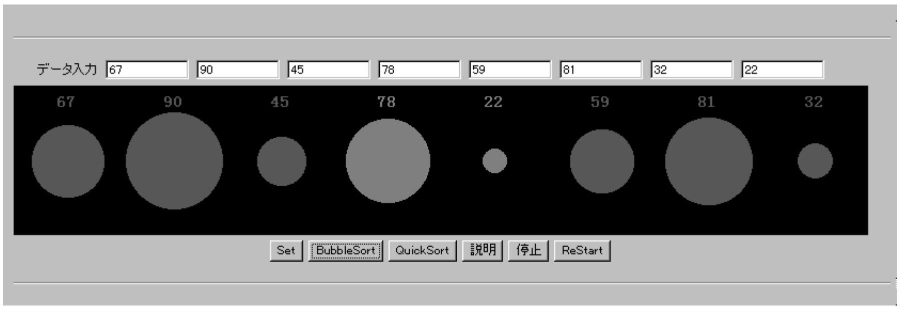
4 %=!<%F%#%s%0$N<B9T$HI>2A

4.1 %P%V%k%=!<%H$N<B9T

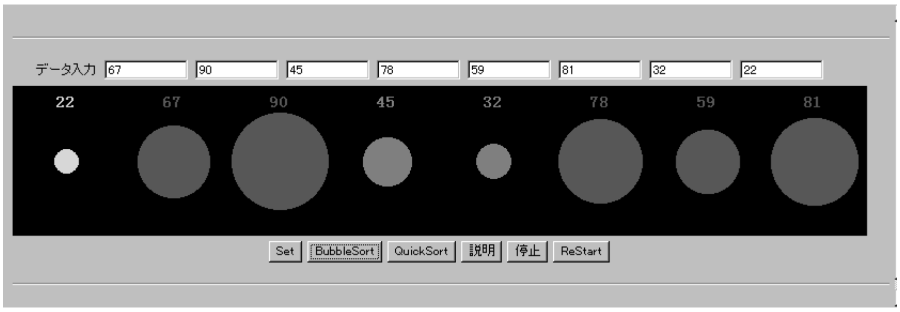
%P%V%k%=!<%HHO!"C1=c8r49K!Hb$$$o$l!"NY$j9g$&%G!<%?$rHf3S$7!"Bg>.$N=g=x$,5U$JiP0LCV$rF~$lBXkH$$$&A`:n$r7+$jJV$9J}K!$G$"$k!#$^$?!"1 2s$N%Q%9$G:G8e$KF~$lBX$($?>l=j$r3P$(F*$-!"<!$N%Q%9GO!"$=$N>l=j$^$G7+Hf3S$r9T$o$J$$!#K\8&5fGO0lHV1&H=NNYj$N%G!<%?$rHf3S$7!"=g!9$K:8KK%+%&%s%?$r>e$2$F$$$/h&KJCF$$$k[9]!#<B:]$N7k2L$G@bL@9k$H?^10 $O%G!<%?$rF~l?=i4|@_Dj$N%"%K%a!<%7%g%s$G$"$k!#$3$3GO!"A4FN1_$r@V?'$K7FI=2h7F$$$k!#?^11 $O!"%Q%9#12sL\$N:8$+$i3 HVL\$H4 HVL\$rHf3S7F$$$k>uBV$r<($7$F$$$k!#?^12 GO!"1 2sL\$N%Q%9$,=*N;$7!"2 2sL\$N%Q%9$K0\$C$F$$$k!#3NH-!":G$b>.$5$$$N1_$N?'$,@V$+$i!"2+?'$KJQ2=$7$F$$$k!#?^13 $bF1MM$K?JaF!"4 2sL\$N%Q%9$,=*N;$75 2sL\$N%=!<%H$,9T$olF$$$k%"%K%a!<%7%g%sG"$k!#?^14 $O%=!<%H$,=*N;7?%"%K%a!<%7%g%sG"$k!#


データ入力 67 90 45 78 59 81 32 22

?^10: =i4|>uBV

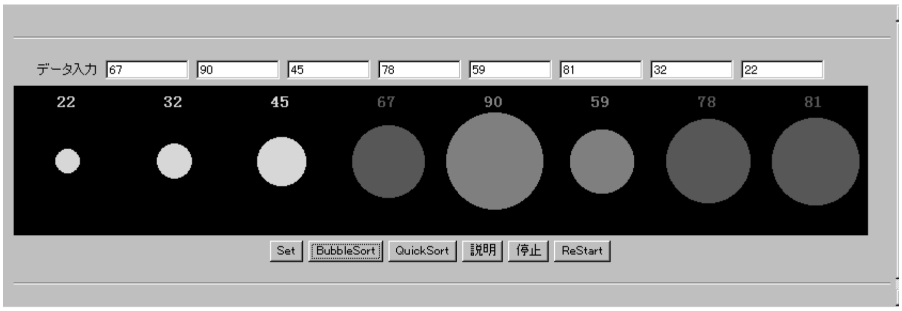

データ入力 67 90 45 78 59 81 32 22

?^11: %Q%91 $NESCfHf3S



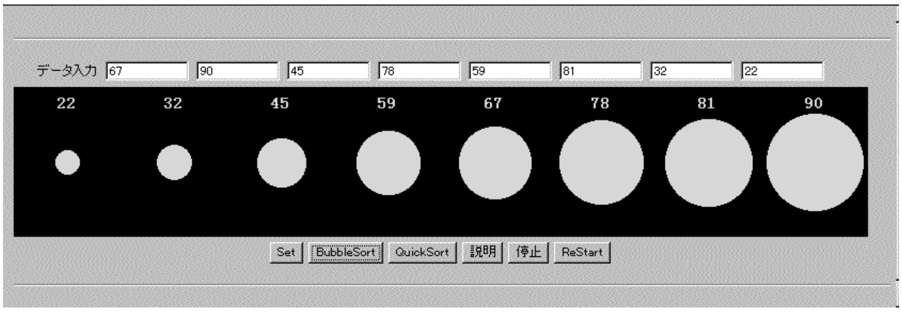
データ入力 67 90 45 78 59 81 32 22

?^12: %Q%92 $NESCfHf3S



データ入力 67 90 45 78 59 81 32 22

?^13: %Q%94 $NESCfHf3S

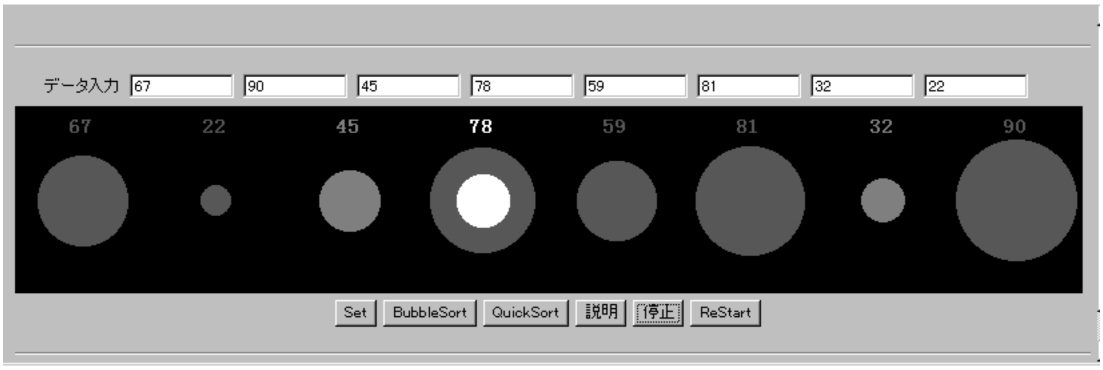


データ入力 67 90 45 78 59 81 32 22

?^14: %=!<%H=*N;

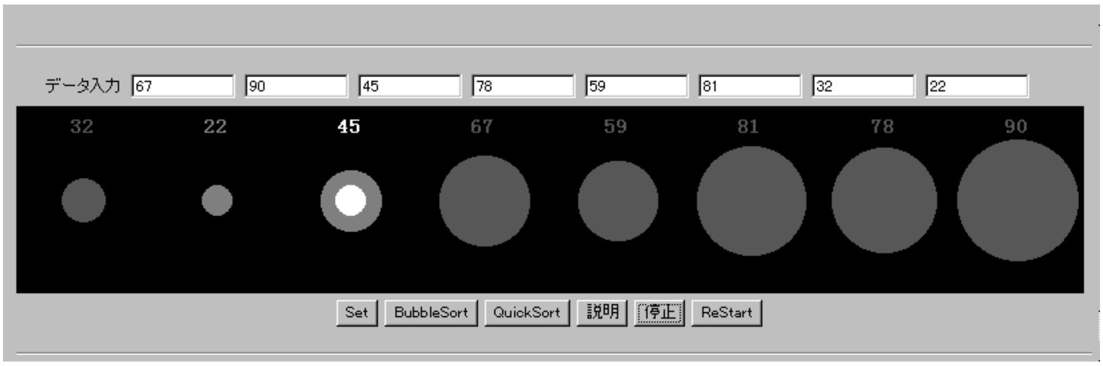
4.2 %/%$%C%/%=!<%H

%/%$%C%/%=!<%H$O:G$bB.$/%=!<%H$r=*N;$9$k%"%k%4%j%:%`$NFb$N$R$H$D$G$"$k!#%/%$%C%/%=!<%H$OJ,3d8r49@0NsK!$H$b$$$o$l$k!#$3$N%=!<%HK!$G$O!"4p=`CM$rDj$a!"1 HV:8$H1 HV1&$+$i$=$N4p=`CM$HHf3S$7!"1 HV1&$,4p=`CMhj$b>.$5$/!"$+$D1 HV:8$,4p=`CM$h$j$bBg$-$1$l$P$=$N2$D$N%G!<%?$rF~$lBX$($k!#$3$NA`:n$rHO0O$r=LaJ$,$i7+jJV9!#1 2sL\$N%=!<%H$,=*N;$9lP!"A4%=!<%H$,40N;$9k^$G:F5"E*$KF1$8A`:n$r7+$jJV$9[9]!#?^15 $O1 2sL\$N%=!<%HESCf$NI=<($rI=$7!"??$sCf$N1_$NCf?4$,JQ2=$7$F$$$k$N$O4p=`CM$G$"$k3H$r<($7$F$$$k!#?^16 $O1 2sL\$N%=!<%H$,=*N;$7!"A0H>ItJ,$@$1$r%=!<%H$7$F$$$k%"%K%a!<%7%g%sG"$k!#?^17 $OA0H>ItJ,$N%=!<%H$,=*$j!"??$sCfItJ,$N%=!<%H$rI=$9%"%K%a!<%7%g%sG"$j!"F1MM$K?^18 $O8eH>ItJ,$N%=!<%H$rI=$7$F$$$k!#?^19 $O%=!<%H7k2L$N%"%K%a!<%7%g%sG"$k!#



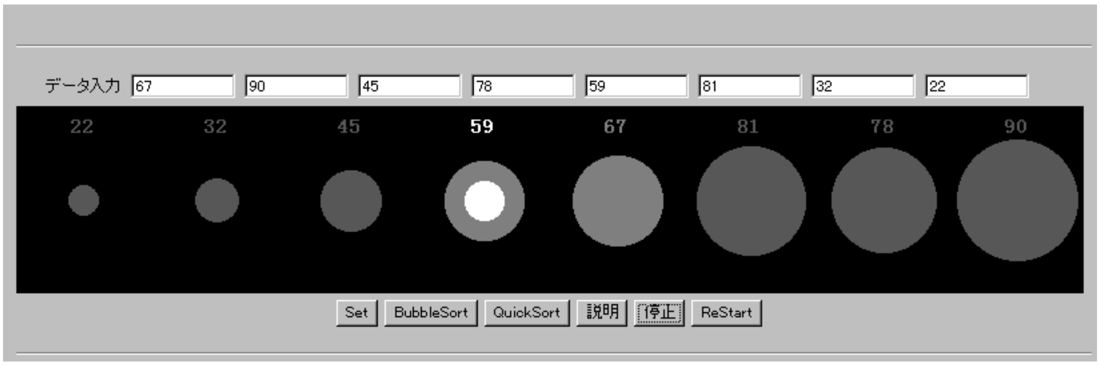
データ入力 67 90 45 78 59 81 32 22

?^15: 1 2sL\$N%/%$%C%/%=!<%H$NESCf7P2a



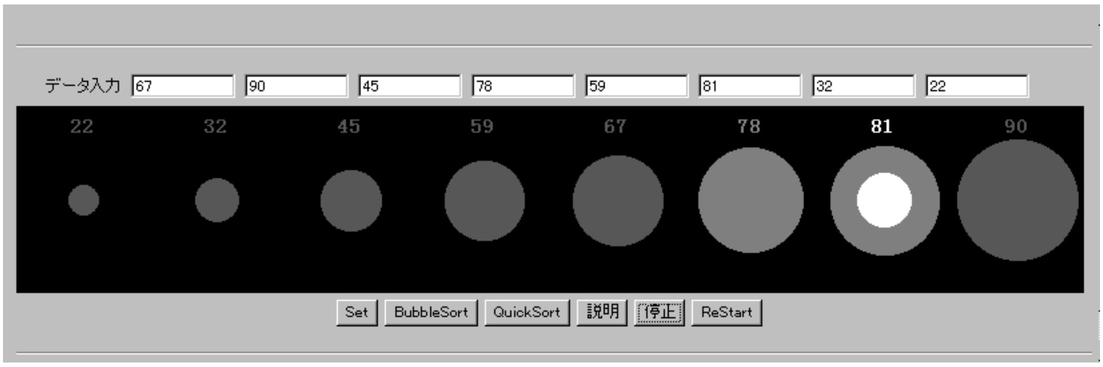
データ入力 67 90 45 78 59 81 32 22

?^16: A0H>ItJ,$N%/%$%C%/%=!<%H$NESCf7P2a



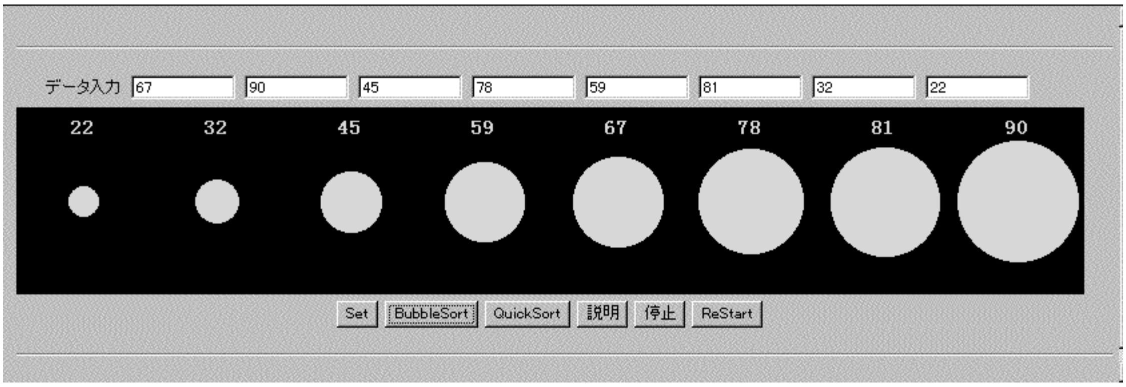
データ入力 67 90 45 78 59 81 32 22

?^17: Cf?4ItJ,$N%/%$%C%/%=!<%H$NESCf7P2a



データ入力 67 90 45 78 59 81 32 22

?^18: 8eH>ItJ,$N%/%$%C%/%=!<%H$NESCf7P2a



データ入力 67 90 45 78 59 81 32 22

?^19: %=!<%H=*N;7k2L

4.3 I>2A

K\8&5f$r?J$a$F$$$/$&$($G!":G$b;~4VrHqd7?NO%G!<%?$NESCf7P2a$NI=<($H%G!<%?$NI=8=G"$k!#ESCf7P2a$O%9%l%C%I$rMQ$$$F2r7hG-k,!"%9%l%C%I$,1 DN>l9g$HJ#?t$N>l9gGO%9%l%C%I$N@8@.K!$,0[JjHs>o$KM}2r$7Ei$$!#K\8&5fGO1 DN%9%l%C%I$r@8@.$7!"$=$N%9%l%C%I$G%G!<%?$NESCfI=<($H@bL@%U%l!<%`$NI=<($r9T$C$F$$$k!#7?$,$C$F!"%P%V%k%=!<%H$H%/%$%C%/%=!<%H$G>l9gJ,1r9T$&I,MW$,$"$j!"2r7h9kNK;~4V$,$+$+$C$?!#%G!<%?$NI=8=GO!"%G!<%?<+BN$,%=!<%H$5lkNG$O8+$?L\$G$OM}2r$7Ei$$$N$G1_$H7FI=<(7?!#$^$?!"Java KD$$$F$NCN<1$,@u$/!"$AgCH7$?$3HGBgJQ;~4VrHqd7?!#K\8&5f$N<B9T$NI>2AH7$F!"%P%V%k%=!<%H$N2D;k2=$OHs>o$KM}2r7d$9$$$H$$$&I>2A$,F@$il?$,!"%/%$%C%/%=!<%H$K4X$7FO!"%P%V%k%=!<%HDx$NM}2r$N;Y1gOG$-$F$$$J$$$H$$$&I>2A$,F@$il?!#J<Ji!"%/%$%C%/%=!<%H%"%k%4%j%:%`$O!"J#;($J%"%k%4%j%:%`$J$&$($K!"Hf3S$5lk%G!<%?$,0lDj$J5,B'$r;}$?$J$$$?aG$"$k!#$=$NHf3S9k%G!<%?$O?'$rJQ$($FI=<($7!"$^$?!"@bL@=q$-$bI=<($9kh$&$K7F2r7h7?!#

$?$@!"%=!<%F%#%s%0%"%k%4%j%:%`$,%P%V%k%=!<%H$H%/%$%C%/%=!<%H$N2<oN`$@$1GJ$/B>$N%=!<%F%#%s%0%"%k%4%j%:%`$b2D;k2=$G$-$?JiI}9-$$;Y1g$,$G$-$kh&KJkH;Wol$k!#

5 $ *$ o$ j$ K

K\8 &5 f$ G$ O! "Java $ rMQ$ $$?%=! <%F% #% s% 0% "% k% 4% j% :% `$ K$ D$ $$ F=R$ Y$ F$ -$ ?! #Java $ r3X=, $ 9$ k$ H$ H$ b$ K! "% f! <% 6$ K$ I$ N$ h$ &$ K%=! <%F% #% s% 0% "% k% 4% j% :% `$ rM }2 r$ 5$;$ k$ +$ r8 &5 f$ 7$ F $ -$?! #$ ^$:! "Java $ N$ I$ N% Q% C% 1! <% 8$ r0 7$ &$ +$ K$ D$ $$ F=R$ Y! "% G! <% ?$ r$ I$ N$ h$ &$ KI =8 =$ 9$ k $ +$ r9 M$ (! "7 kO @$ H$ 7$ F; k3 PE *$ KM }2 r$ 7$ d$ 9$ $$ h$ &1 _$ K$ 7$ FI =8 =$ 7$?! #$ ^$?! "K \8 &5 f$ G: G$ b =EMW$ J%=! <% HE SC f$ NI A2 h$ K$ D$ $$ F$ b Thread %/% i% 9$ rMQ$ $! "<B9 T$ r@)8 f$ 5$;$ k$ 3$ H$ K$ h$ j <B8 =$ G$ -$?! #B >$ NF CD '$ H$ 7$ F! "% G! <% ?$ NH f3 S; ~! "%=! <% H: Q% G! <% ?$ N3 NG '$ J$ I$ r<B8 =$ 5$;$ k $?$ a$ K Java $ N Color %/% i% 9$ rMQ$ $? 'J, $ 1$ 9$ k$ 3$ H$ G2 r7 h$ G$ -$?! #$ ^$?J dB -$ H$ 7$ F! "% "% K %a! <% 7% g% s$ @$ 1$ G$ OM }2 r$ 7$ E$ i$ 1$ 1$ P! "? 7$ 7$ $% U% 1! <% `$ rI =< ($ 7! "$ =$ 3$ K% P% V% k%=! <% H$ H %/% $% C% /%=! <% H$ N@ bL @$ r: \$;$ k$ h$ &$ K$ 7$?! #

$ 7$ +$ 7! "% G! <% ?$ r1 _$ K$ h$ jI =8 =$ 9$ k$?$ a% G! <% ?$ N8 D? t$,@)8 B$ 5$ 1$ kL dB j$,$ "$ j! "5 ,LO$ N B ?$ $%=! <% F% #% s% 0$ N2 D; k2 =$ OI T2 DG =$ G$ "$ k! #$ ^$?! "% G! <% ?$ ND >7 B$,B g$ -$ 9$.$ k$ H1 _F 1; N$, =E$ J$ jJ ,$ +$ j$ E$ i$ /$ J$ kL dB j$,$ "$ k! #

$ 3$ 1$ i$ NL dB j$ r2 r7 h$ 9$ k$ H6 &$ K! "%=! <% F% #% s% 0% "% k% 4% j% :% `$ N% U% m! <% A% c! <% H? ^$ J$ I$ H J; $ ;$ F8 +$ 1$ 1$ P$ 5$ i$ K! "%=! <% F% #% s% 0% "% k% 4% j% :% `$ NM }2 r$ r; Y1 g$ 9$ k$ @$ m$ &! #

<U<-

K\8&5f$N5!2q$rM?$($F2<5j!"?t!9$N=u8@$rD:$-$^7?;3:j>!9065<x$K?4$h$j46<UCW$7$^$9!#$^$?!"K\8&5fK"$?$j!"$$$m$$$mJLLG5.=E$J8f0U8+$d!"Ne$^$7$rD:$-$^$7$?K\8&5f<<$N3'MMKb?4hj46<U7^$9!#

5i$K!"$*K;$7$$Cf?t!9$N<ALd$KEz$($F$$$?$@$$$?!"@u@nC#Lo;a!">eJ?>M;L;a$K?<$/46<U7^$9!#

; 29MJ88 %

[1] Stephan R.Davis Cx ! 5>ED 980l 4FLu ! 7,ED 2mI' ! &C0z >;90 6&Lu: Microsoft Visual J++ %;%k%U%^%9%?!<%V%C%/, Microsoft PRESS(1996)

[2] PETER van der LINDEN Cx !'CfED=(4pLu !'just JAVA , ASCII =PHG6I(1997)

[3] F|8~=SFs !'F~Lg Visual J++ , SHOEISHA(1997)

[4] 8M>>K-OB !'JAVA %W%m%0%i%`%G%6%$%s, SOFTBANK BOOKS(1997)

[5] 2O@>D+M: !'Internet Language3 Java F~Lg, 5;=QI>O@<R(1997)

[6] Paul Tyma !&Gabriel Torok !&Troy Downing !'JAVA %Q%o!<%W%m%0%i%_%s%0, SOFTBANK BOOKS(1996)

[7] %m%8%c!<%j!< !'JAVA+VRML , %W%l%s%F%#!<%[!<%k(1996)

[8] ETAR?.<y !'%Q%=%3%s$H%M%C%H%o!<%/$rMQ$$$?9V5A; Y1g$N; n$_!"J?@. #7G/EY>pJs=hM}650i8&5f=82q9V5AO@J8=8!"pp.9-20(1995)

[9] @>86@60l !'(?7%3%s%T%e!<%?%5%$%(%s%99V:B) %G!<%?9=B$, %*!<%`<R (1993)