B4 6H O@ J8

Java Kh$k
%^%k%A%9%l%C%I%W%m%0%i%_%s%0

;a L> !’D.EDN49,
3X@RHV9f !’2210950209-3
;XF3650w !’;3:j>!9065<x
Ds =P F| !’1999G/27n16F|

N)L?4[Bg3XM}9)3XIt>pJs3X2J

!!

FbMF9<35

K\O@J8GO!"Java $N%^%k%A%9%l%C%I%W%m%0%i%_%s%0K*$$$F!"%7%s%0%k%9%l%C%I$H%^%k%A%9%l%C%I$N$=$l$>$l$N2DG=@-$K$D$$$F=RYk!#Java GO!"8@8l<+?H$K%9%l%C%I5!G=$,%5%]!<%H5l$F$$$k3Hb"$j!"%W%m%0%i%`$r=q$/>e$G%9%l%C%I$rHr$1$F$ODL$l$J$$$b$N$K$J$C$F$$$k!#$@$,!"$3$N5!G=$rM-0U5A$K;HMQ$9$k$3$H$K$h$C$F!"F1;~$KJ#?t$NF0:n$rA`$k3H$,=PMh$k%W%m%0%i%`$r3+H/$9k3H,2DG=G"$k!#

%M%C%H%o!<%/8@8lG"$kJava K*$$$F!"%9%l%C%I5!G=$r;HMQ$9$k>l$H7F!"J#?t$NF0:n$rF1;~$K;HMQ$9$k;~$K;HMQ9k!"%"%W%l%C%H4X78$N%W%m%0%i%`$H!"F~=PNOF0:n$H7W;;ItJ,$rJ,$1!"%f!<%6$K!"Java %W%m%0%i%`$,D9$$7W;;$r40N;$9k^$G!":n6H$rCfCG7FBT$AB3$1kI,MWrJ/$9!"%M%C%H%o!<%/4X78$N%W%m%0%i%`KBg-$/JL$lk,!"K\O@J8GO!"%"%W%l%C%H4X78$rCf?4$K=RYF$$$k!#

L\<!

?^L\<!

I=L\<!

1 O8aK

Java 8@8l$O%9%l%C%I5!G=$rE}9g7F$*$j!"%]!<%?%V%k$J%^%k%A%9%l%C%I%W%m%0%i%`$r:n@.$9$k$3$H$,$G$-$k!#$[$H$s$I$N>l9g!"%9%l%C%I$r$^$C$?$/9MN8$9$k$3$H$J$/Java $N%W%m%0%i%`$r=q$/3H$,=PMh$k!"3N5!G=$r>e<j$K3hMQ9k3HNhCF!"F1;~$KJ#?t$NF0:n$rA`$k$3$H$,=PMh$k%W%m%0%i%`$r3+H/9k3H$,2DG=$G$"$k!#

%^%k%A%9%l%C%IObHb$H!"%*%Z%l!<%F%#%s%0%7%9%F%`$N3+H/<T$d%7%9%F%`%W%m%0%i%^$,HsF14|$N=hM}$r5-=R$9k?aKMxMQ5lF-$F$$$k!#%9%l%C%I$O!"Hs>o$KHFMQE*$KJB9T@-$r07$&$3H,G-$k%D!<%k$JNG!"MM!9$JJB9T%7%9%F%`$G<B:]$K;H$olF$$$k!#7+7=$N0lJ}$G!"%9%l%C%I$r;H$C$?%W%m%0%i%_%s%0$O%P%0$,@8$8d9$/!"%G%P%C%0$b:FqJN,0lHLE*G"$k!#

Java $N%9%l%C%I%7%9%F%`$O!"B>$N8@8l$N%9%l%C%I%7%9%F%`$HHf3S9k$H!"3N$+$K9=J8$N?t$O>/$J$/M^$(il$F$$$k!#3N%7%s%W%k5f$($K!"Java $N%9%l%C%I%7%9%F%`$O3X$S$d$9$/!"%9%l%C%I$r$"$^$jCN$i$J$$3+H/<T$G$b!"Hf3SE*MF0W$K4pACE*$J%9%l%C%I%W%m%0%i%`$rM}2rG-$k!#$7$+$7!"3N%7%s%W%k5H0z$-BX$($K!"LdBj$bL5$$$o1GOJ$$!#D^$j!"B>$N%9%l%C%I%7%9%F%`K"kh$&$J!"9bEY$J5!G=$,Java KO$J$$$NG"$k!#$7$+$7J,$i!"Java 3+H/<T$O!"Java $GDs6!$5lkC1=c$J9=@.MWAG$+$i!"9bEY$J5!G=$r:n$j>e2F$$$/3HbG$-$k!#[6]

K\8&5fGO!"Java K*$$$F$N%^%k%A%9%l%C%I%W%m%0%i%_%s%0GO!"INMMJ3H,G-kN$@$m$&$+!#%7%s%0%k%9%l%C%I$N;~$H!"$$$C$?$$$INMMJ0c$$$,B8:_7F$$$kN+$r!":n@.$7$?%W%m%0%i%`$rDL7F8!>Z7F$$$k!#J*!"K\8&5fGO!"%"%W%l%C%HKh$k%^%k%A%9%l%C%I%W%m%0%i%_%s%0KD$$$F<g$K=R$Y$F$$$k!#

Java 8@8l$O!"1990 G/12 7n$K!"Sun Microsystems <RKhCF !V0%j!<%s%W%m%8%'%/%H!WH7$F3+H/$,;O$^$j$^$7$?!#=i$a$O!"!VOak!W$H$$$&L>A0$N!"2HEE@=IJ$N$?$a$N%W%m%0%i%_%s%08@8l$H7F!";:@<$r>e$2$^$7$?!#Ev=iOak $H$$$&L>$G8F$PlF$$$?3N8@8l$O!"%3%s%Q%/%H$G?.Mj@-$,9b$$>e$K!"%"!<%-%F%/%A%c!<$+$iFHN)$7$?$bNG$"$C$?!#Java $H$$$&L>A0$O!"Oak $H$$$&L>>N$,$9GK>&I8EPO?5l$F$$$?$?$a$K!"$3$NL>A0$KJC$?!#Java $O!"C+!\$r%Y!<%9K7J,$i!"Objective-C $dSmalltalk JI$N8@8l;EMM$b<h$jF~lF$$$k!#3N3mEP>l7?World Wide Web $K!"1994 G/!"Java $rBP1~$5$;$k3HKJ$j!"$=$N8e1995 G/$KH/I=5l!"1996 G/$K8x3+$5lF$$$k!#

K\O@J8GO!"#2>O$G%9%l%C%I$K$D$$$F$N4pK\E*$J@-<A!"%9%l%C%I$N;HMQJ}K!$K$D$$$F!"$=

7F!"%9%l%C%I$r;HMQ$7$F$$$kJava 8@8lKD$$$F=RYF$$$k!##3>OGO!"%9%l%C%I$r;HMQ$7
$?$iINh&J3H,=PMhkN$+!"%9%l%C%I$r;HMQ7?bN$H!";HMQ$7$J$$$bNHGOIN
h&$J0c$$$,8+ilkN$+$r!":n@.7?%W%m%0%i%`$rMQ$$$FDI5a7F$$$k!##4>OGO!"#3>O
GN7k2LrF'^$($FI>2Ar7$F$$$k!##5>OGO!"K\O@J8GN7kO@$H:#8e$N2]Bj$r<($7$F$$$k!#

2 %^%k%A%9%l%C%I%W%m%0%i%_%s%0

2.1 %9%l%C%IHO

%9%l%C%IHO$$$C$?$$$INh$&$JbNG7g&$+!#$3$N%9%l%C%I$H$$$&8@MU$O!V@)8f$NF;6Z!thread of control!KW$H$$$&8@MU$r>JN,$7$?$bNG$"$k!#D^$j!V@)8f$NF;6Z!WHO!"#1DN%W%m%0%i%`NCfG!"B>$N!V@)8f$NF;6Z!WHOFHN)$K<B9T$5lk%3!<%I$NCGJR$N3HG"$k!#

C`<!%W%m%0%i%`$O!"3+;O!"=*N;!"=hM}$,$"$j!"%W%m%0%i%`<B9TCf$N$$$+$J$k0lDj;~4V$K$*$$$F$b!"<B9T9`L\$O#1DG$"$k!#%7%s%0%k%9%l%C%IKb!"3+;O!"=*N;!"=hM}$,$"$j!"%9%l%C%I$N<B9TCf$N$$$+Jk0lDj;~4VGb!"<B9T9`L\$O#1$D$G$"$k!#$7$+$7!"%9%l%C%I$=$l<+?H$O%W%m%0%i%`GO$J$$!#%9%l%C%I<+?HGO<B9T9k3H$,$G$-$J$$$,!"%W%m%0%i%`Fb$G<B9T$5lk!#

%7%s%0%k%9%l%C%I$N35G0$K?7$7$$$3HO2?bJ$$!#%9%l%C%IKD$$$F<B:]$KA{$,lF$$$kNO!"%7%s%0%kC`<!%9%l%C%I$K$D$$$F$G$O$J$/!"$I$A$i$+$H8@$&$H!"$R$H$D$N%W%m%0%i%`NCfG!"9Y$FF1;~$K<B9T5l!"$+$D0[Jk%?%9%/$r<B9T$9$k!"%^%k%A%9%l%C%I$N;HMQKD$$$FG"$k!#

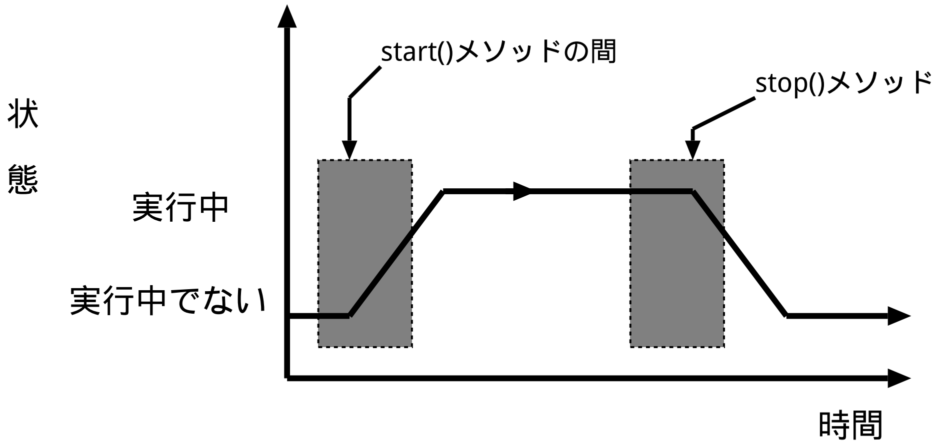
%9%l%C%I$O7h$7$F?7$7$$35G0GO$J$$!#C %W%m%0%i%^$,%9%l%C%I:n@.$N$?$a$KMxMQ$9$k!"%i%$%V%i%j$rDs6!$9$k%*%Z%l!<%F%#%s%0%7%9%F%`$b$"$C$?!#Java 8@8l$HF1$8$h$&$K!"8@8l<+?H$NCf$KAH$_9~$^$l$?%9%l%C%I$r%5%]!<%H$9$k!"Ada $N$h$&$J%W%m%0%i%_%s%08@8l$b$"$k!#$7$+$7!"%9%l%C%I$O!"FCJL$J%W%m%0%i%`$r:n$k>l9gKN$_$KI,MWG"kH!"9M$($ilF$$$?!#Java $N=P8=!"$=$N?M5$$KhC$F!"%9%l%C%I$K$D$$$F$NM}2r$,?<$^$C$F$$$k!#

2.2 Java 8@8lGN%^%k%A%9%l%C%IKD$$$F

%9%l%C%IHO!"#1$D#1$D$N%W%m%;%9$N;vG"$j!"%^%k%A%9%l%C%I$O!"%W%m%0%i%`Fb$GJ#?t$N%W%m%;%9$r5/F0$9$k$3$H$K$h$j!"J#?t$N=hM}$rF1;~$K9T$&$3$H$G$"$k!#$3$l$K$h$j!"#1$D$N%9%l%C%I$G!"D9$$7W;;$r9T$$$J$,$i!"B>$N%9%l%C%I$G%f!<%6$HBPOC$r9T$&$3$H$,2DG=$K$J$k$o$1$G$"$k!#$3$&$9$k$H!"%f!<%6$O!"Java %W%m%0%i%`$,D9$$7W;;$r4ON;$9k^$G!":n6H$rCfCG7FBT$AB3$1kI,MW,J/Jk!#

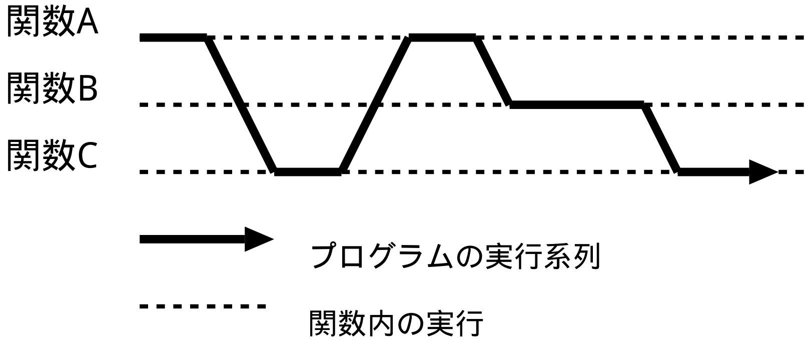
=>Mh$N%W%m%0%i%_%s%08@8l$G$O!"%^%k%A%9%l%C%IBP1~$N%W%m%0%i%`:n@.OHFbJ#;(KJCF7^CF$$$k$,!"#J#a#v#a$O8@8l<+?H$K%9%l%C%I!&5%]!<%H$,AH$_9~$^$l!"%9%l%C%I$N3+;O!"<B9T!"Dd;_!">uBV$N%A%'%C%/$JI,4JC1$K9T$(kh$&$KJC$F$$$k!#

Java K*$$$F%9%l%C%IO?$$$X$s=EMW$J%F!<%^G"k?$a!"%9%l%C%I%7%9%F%`$N5!G=$NB?$/$O Java 8@8l<+?H$NCfKAH_9~$^$l!"$^$?#1It$N5!G=$O Java 2>A[%^%7%sGI,MWH5l$F$$$k!#Java $r;H$&H-$O%9%l%C%I$OI,MWIT2D7gJbNHJk!#



?^1: %9%l%C%I$N>uBV

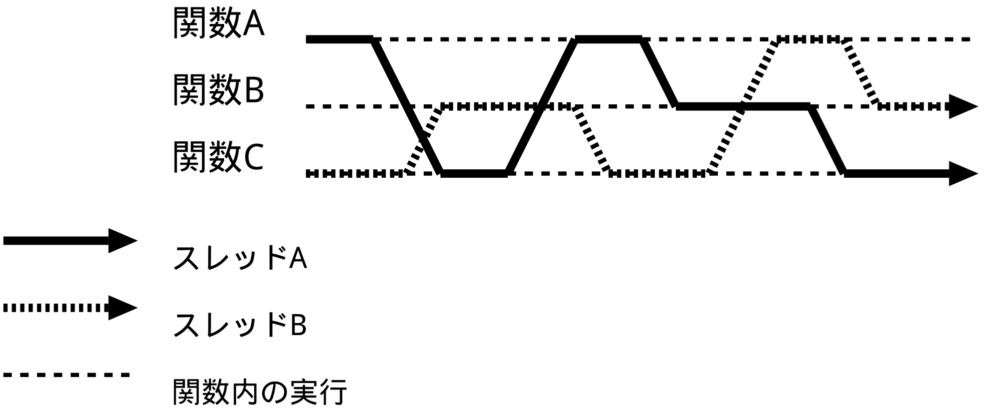
%9%l%C%I$N@8$-$F$$$k4VCf!"Java %9%l%C%I$O$$$/D+$N>uBV$N0lDK$"$k!#%9%l%C%I$N>uBV$O Thread $,2?$r9TCF$$$k$+!"$^$?$=$N;~2?$r9T$&$3H,G-k+$r<($9!#<B9TCf$+!"%9%j!<%W$7$F$$$k$+!"; `$s$G$$$k$+$J$I!#(?^1;2>H)



?^2: %7%s%0%k%9%l%C%I

%9%l%C%I$,#1$D$N%7%s%0%k%9%l%C%I$G$O!"?^2$Nh&$KN.$l$,#1$DG"$k!#

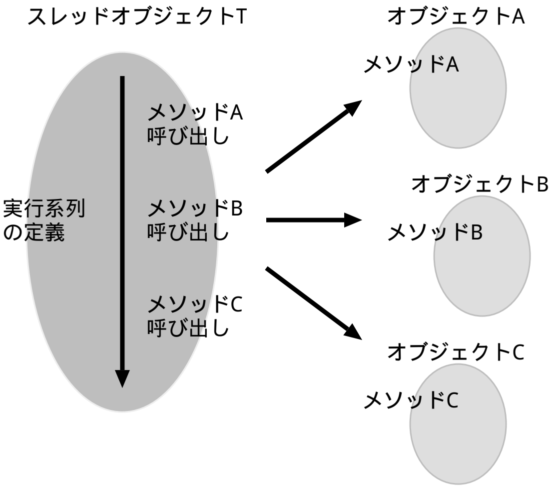
%9%l%C%IA!"%9%l%C%IB $N#2$D$N%9%l%C%I$G<B9T9k$H!"0J2<$Nh&KJ$k!#



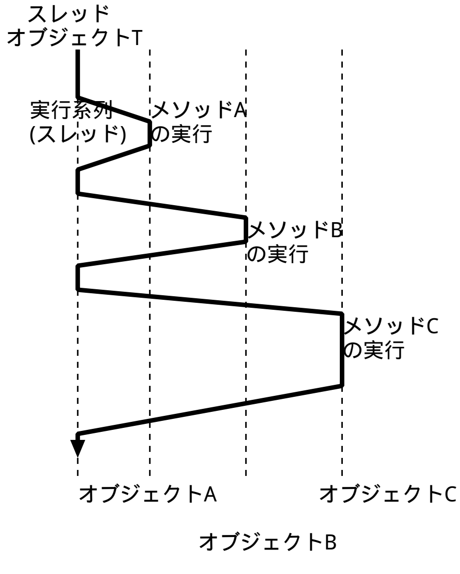
?^3: %^%k%A%9%l%C%I

%9%l%C%I$,J#?t$N%^%k%A%9%l%C%IGO!"?^3Nh$&$K%W%m%0%i%`(%W%m%;%9) $rJ#?t$N@)8f7ONs$G<B9T$9$k!#

Java GO!"#1$D#1$D$N%9%l%C%I$O!"%9%l%C%I%*%V%8%’%/%HH7$FI=8=$5lF$$$k!#%9%l%C%I$O!"%W%m%0%i%`$N<B9T7ONsG"$j!"%a%=%C%I$,8F$S=P$5lk7ONsG"$k!#2<$N?^$O!"%9%l%C%I$r%*%V%8%’%/%H$r;H$C$FI=8=$7$?$H$-$N?^G"$k!#



?^4: %*%V%8%’%/%HKh$k%9%l%C%I$N<B8=



?^5: %W%m%0%i%`$N<B9T

3NNcGO!"!V9%l%C%I%*%V%8%'%/%HT!WKh$j#1$D$N%9%l%C%I$r:n@.7F$$$k!#%9%l%C%I$O!"%9%l%C%I%*%V%8%'%/%HT NCfN !VB9T7ONs$ND j5A!W$K=>CF=gHV$K<B9T$5lk!#

3lhj!"%9%l%C%I%*%V%8%'%/%H$O!">o$K<B:]$K<B9T$5lk%9%l%C%IGOJ/!"%9%l%C%I$r<h$j07$&$?aN%*%V%8%'%/%H$H8@$($k!#Java GO!"%9%l%C%I$N<B9T7ONs$ND j5A$r!"%9%l%C%I%*%V%8%'%/%H$N !Vrun %a%=%C%I!WNCfK5-=R9k!#

2.3 Java 8@8l$NFCD'

8=:_!"%W%m%0%i%_%s%08@8l$O@1$N?t$[$I!"B8:_7F$$$k$H8@$olF$$$k!#3F8@8lKO$=$l$>$l$KFCD'$,$"$k$,!"$=NCfN#1DG$"$kJava 8@8lKO!"0J2<Nh$&$JFCD'$,$"$k!#

I=1: Java 8@8l$NFCD'

!&OS $N0c$$$r0U<1$;$:$K3+H/2DG=
!&%*%V%8%'%/%H;X8~%W%m%0%i%_%s%08@8l
!&%$%s%?%W%j%?7?8@8l$JNG!"<B9TB.EY$OB.$/$J$$
!&J,;6=hM}$,=PMh$k
!&%;%-%e%j%F%#!<$,9b$$
!&%^%k%A%9%l%C%I$,MF0W

2.3.1 %*%V%8%'%/%H;X8~

#J#a#v#a$O%*%V%8%'%/%H;X8~8@8l$G$"$k!##J#a#v#a$N%"%W%j%1!<%7%g%s$O%*%V%8%'%/%H$H8F$PlkItIJ$N4s$;=8aG9=@.5l!"$=$NItIJ$O$$$/D+$N%W%m%0%i%`$G6&M-9k3H$,2DG=$J$?$a!"3+H/@8;:@-$N8~>e$KbDJ,$k!#

$^$?!"JQ99$,$"C?>l9gGb!"3:EvItIJ$rD>$9$3$H$G4X78$r;}$DItIJ$K!"$=$NJQ99$r7Q>5$9k3H,2DG=JN$G!";~4V$r$+$1F=l>lNItIJ$rD>$7$?$j!"$"$kItIJ$rD>$7K:lF%P%0 !JJT6q9g!K$rH/@8$5$;$kh&J3H,$J$$!#$=$7$F!"<B@S$N$"$kItIJ$N;HMQ$Khj!"%W%m%0%i%`$NIJ<A$N8~>e$b4|BT$G$-$k!#

I=2: %*%V%8%'%/%H;X8~$NNr;K

Simula	#7#0G/BeO8$a N%;6;v>]%7%_%e%l!<%7%g%sMQ
SmallTalk	#7#0!<#8#0G/BeO8$a %*%V%8%'%/%H;X8~8@8l@.N)
C++	#1#9#8#3G/0J9_ :G$bIa5Z!"<B9TB.EY$OB.$$
Java	#1#9#9#5G/0J9_ %^%k%A%W%i%C%H%U%)!<%`!"J,;6JBNs

I=3: %*%V%8%'%/%H;X8~$NMxE@

!&3+H/$N9bB.2=$,?^lk
!&:FMxMQ2DG=
!&%P%0$,>/$J$$
!&=@Fp@-!"3HD%@-$,$"$k
!&J,;6=hM}$,$G$-$k
!&<B@$3&$H$N@09g@-

2.3.2 %$%s%?%W%j%?7?8@8l

%$%s%?%W%j%?$K$O!"BASIC $dMS-DOS $N%P%C%A%U%!%$%kNh$&$K!"%=!<%9%3!<%I$rD>@\1 9T$:$D2r<a$7J,$i<B9T$9kbNb$"$k$,!"Java 8@8l$G$O!"$"i+8aCf4V%3!<%I$H8F$Plk7A<0$K%3%s%Q%$%k7F$*$$$F!"Cf4V%3!<%I$NFbMF$K=>CF!"%W%m%0%i%`$N<B9T$r9T$&!#

Java 8@8l$O!"%3%s%Q%$%i7?hj<B9TB.EY$,CY$$!"%$%s%?%W%j%?7?$r:NMQ7F$$$k!#%$%s%?%W%j%?7?$r:NMQ9k3HKhCF!"IN%^%7%sGbF0$/0\?"@-!"%;%-%e%j%F%#!<$NLLGN%$%s%?%W%j%?7?$NFC@-$r3h$+7F$$$k!#

I=4: %3%s%Q%$%i7?8@8l$H%$%s%?%W%j%?7?8@8l$NHf3S

	%3%s%Q%$%i7?	%$%s%?%W%j%?7?
8@8l	Fortran!"C!"C++	Lisp!"Basic!"Java
<B9T J}K!	D>@\CPU $, %W%m%0%i%‘$r<B9T	%=%U%H%&%'%"$G:n$il? %$%s%?%W%j%?$G<B9T
<B9T8zN(	!}	"$
3+H/8zN(	!{	!}
=@Fp@-	!{	!}

!}: NI$$!{: IaDL"$: ddNt$k

2.3.3 0\?"@-

I=5: Java $N%]!<%?%S%j%F%#

	%P%$%H%3!<%I				
	@lMQ Java %$%s%?%W%j%?	@lMQ Java %$%s%?%W%j%?	@lMQ Java %$%s%?%W%j%?	@lMQ Java %$%s%?%W%j%?	@lMQ Java %$%s%?%W%j%?
OS	UNIX	Windows	MacOS	UNIX	UNIX
%O!<%I%&%'%"	Intelx86		Macintosh		Sun Sparc

Java %W%m%0%i%‘$O!"%"!<%-%F%/%A%c$KCfN)$J%P%$%H!&%3!<%I7A<0$r:NMQ$7$F$$$k!#3N#1HV$NMxE@$O!"Java Virtual Machine $,<BAu$5lF$$$k%7%9%F%‘G"lP!"%W%i%C%H%U%)!<%‘$K0MB8$9k3HJ$/$=$N%W%m%0%i%‘$r<B9T9k3H$,$G$-$k!# D^$j!"$I3G:nC?

%W%m%0%i%`G"m&Hb!"Java $r%5%]!<%H$5$($7$F$$$l$P!"Windows $dUNIX!"$=7F Macintosh K*$$$F$bJava %"%W%j%1!<%7%g%s$r8zN(h/0\9T9k3H$,$G$-$k!#

$=$7$F!"Java GO5i$K?JsG!"8@8l;EMM$K !"VBAu0MB8!W$NE@$,$J$$$3HrL@3NK7$F $$$k!#Nc$($P!"4pK\%G!<%?7?$O!"1i;;$N?6$kIq$$$HHb$K!"$=$N%5%$%:$bL@3N$K;XDj5l $F$$$k!#

I=6: Java 4pK\%G!<%?7?

7?	<hj&$k CM	%G%U%)%k%HCM	%5%$%:	:G>.CM :GBgCM
boolean	true or false	false	#1 %S%C%H	J7 J7
char	Unicode J8;z		#1#6 %S%C%H	
byte	Id9gIU$-@0?t	0	#8 %S%C%H	-128 127
short	Id9gIU$-@0?t	0	#1#6 %S%C%H	-32768 32767
int	Id9gIU$-@0?t	0	#3#2 %S%C%H	-2147483648 2147483647
long	Id9gIU$-@0?t	0	#6#4 %S%C%H	-9223372036854775808 9223372036854775807
float	IEEE754 IbF0>.?t	0.0	#3#2 %S%C%H	±3.40282347E+38 ±1.40239846E-45
double	IEEE754 IbF0>.?t	0.0	#3#2 %S%C%H	±1.79769313486231570E+308 ±4.94065645841246544E-324

boolean 7?$OFCJL$G!"true!"false $N$$$:l+NCMrHk!#if J8$dwhile $N>r7o<0$N7k2L$O 3N7?GJ1lPJiJ$$!#B>$N7?$H$NJQ49$O=PMh$J$$!#boolean 7?0J30$N4pK\%G!<%?7? I&7O!"7?JQ49$r9T$&3H$,$G$-$k!#

Java $O!"J8;z%3!<%IBN7O$H7F!"Unicode $r:NMQ$7$F$$$k!#

2.3.4 API(Application Prigramming Interface) %Q%C%1!<%8

Java %Q%C%1!<%8HO!"4X78N"$k%/%i%9$d%$%s%?!<%U%'!<%9$r%0%k!<%WK9$kJ}K!$G$"$k!#%Q%C%1!<%8$O%/%i%9$r%0%k!<%WC10LK7$F!"I,MW$JH-$@$1;H$($kh&K9$k!#

JavaAPI $O!"<!$N#8DN%Q%C%1!<%8$GDj5A$5l?%/%i%9$+$i@.$jN)$C$F$$$k!#

3N#8DN%Q%C%1!<%8$O!"$9YFJava $H$$$&L>A0$G;O$^$j!"$9YF$NJava $N<B9T7O$G;H$($k3H$,J]>Z$5lF$$$k!#

3NB>$K!"I8=`E*$G$J$$%Q%C%1!<%8H7$F!"!VSun!W!VNetscape!W$G;O$^$k%Q%C%1!<%8b"$k!#

I=7: JavaAPI $N%Q%C%1!<%8

%Q%C%1!<%8L>	FbMF
java.applet	%"%W%l%C%H$r<BAu$9$k%/%i%9
java.awt	%0%i%U%#%C%/%9JI$NGUI $N%/%i%9
java.awt.image	%$%a!<%8=hM}$N%/%i%9
java.awt.peer	%W%i%C%H%U%)!<%`0MB8$NGUI %D!<%k%-%C%H%Q%$%s%?!<%U%'!<%9
java.io	%U%!%$%kF~=PNO$K4X9k%/%i%9
java.lang	8@8l$N%3%"%/%i%9
java.net	%M%C%H%o!<%/$N%/%i%9
java.util	HFMQ%G!<%?9=B$$N%/%i%9

API $rMxMQ$9kK$O!"MxMQ$7$?$$%/%i%9$rimport J8$G%m!<%I9k!#import J8$N0lHL=q<0$O<!NDLjG"$k!#

```
#1   import     %Q%C%1!<%8L>.%/%i%9L>;
#2   import     %Q%C%1!<%8L>.*;
```

#1$N=q<0$G$O!";XDj$7$?%Q%C%1!<%8$N;XDj7?%/%i%9$r%m!<%I$9$k!#

#2$N=q<0$G$O!";XDj$7$?%Q%C%1!<%8$K4^$^$lk9YF$N%/%i%9$r%m!<%I9k!#

2.3.5 %;%-%e%j%F%#!<

Java $O!"%M%C%H%o!<%/4D6-$G;Holk3HrA0DsH7$F$$$k$?$a!"%;%-%e%j%F%#!<$O=EMW$J4X?4;vHJCF$$$k!#

Java 8@8l$O%]%$%s%?$r;HMQ$7$F$$$J$$$?$a!"C 8@8l$Nh&$K!"%]%$%s%?rDL7$F%a%b%j$NFbMF$rD>@\FI$_=q$-$9k3H,G-$J$$!#%3%s%T%e!<%?%&%$%k%9$O!"%a%b%j>eKFI_9~$^$l$F$$$k%*%Z%l!<%F%#%s%0%7%9%F%`$Nl It$r=q-49($F>cCs$7$?$j!"<B9T%U%!%$%k$r=q-49(k3HG!"%3%s%T%e!<%?Fb$K@xF~$9$k!#%a%b%j$rD>@\FI$_=q$-G-$J$$$H8@$&$3HO!"%a%b%j$K>cCs$9$k%?%$%W$N%&%#%k%9$N@xF~rKI0$3$HKDJ,$k!#

$@$,!"%M%C%H%o!<%/4D6-GO!V40A4$K0BA4$G$"$k!W$H$$$&3H$O!"IT2DG=$G$"$k!#Java GO!"!VE,EY$K0BA4$G$"$k!W4D6-$rDs6!$7$F$$$k!#

3 3F<o%W%m%0%i%`$N%^%k%A%9%l%C%I$Khk<B8=

3.1 %^%k%A%9%l%C%IKh$k%W%m%0%i%_%s%0

%"%W%l%C%H%/%i%9$G%9%l%C%I$r;HMQG-kh$&$K9k$?$aKO!"Runnable %$%s%?!<%U%'!<%9$r<BAu9k!#D^$j!"!Vimplements Runnable!W6g$r;HMQ$9$k!#$3lKhj!"run %a%=%C%I$,<BAu$5lk!#

0J2<$K%9%l%C%I7?%W%m%0%i%`$N=q<0$r<($9!#

```
   public class %U%!%$%kL> extends Applet implements Runnable{
                                                  -------------------
                                                          ", #1
   Thread %9%l%C%IL>_#1 = new Thread(this);   "+  #2

public void start(){
          %9%l%C%IL>_#1.start();          "+ #3
                   }

   public void run(){
     %f!<%6$,=hM}$7$?$$FbMF$r5-=R          "+ #4
                     }

   public void stop(){
          %9%l%C%IL>_#1.stop();           "+ #5
                      }
}
```

#1 Runnable %$%s%?!<%U%'%$%9$r<BAu!"$3lKhj%"%W%l%C%H$G%9%l%C%I$r;HMQG-$k4D6-$KJk!#

#2 %9%l%C%I !&*%V%8%'%/%H$N@8@.!#$7$+$7!"3+;OO7$F$$$J$$!#3N>uBVGO!"%9%l%C%I%*%V%8%'%/%H$O6u$G$"$k!#=>CF%7%9%F%`%j%=!<%9$K3d$jEvFilF$$$J$$!#$3$3GO!"start $^$?$Ostop %a%=%C%I$N$_MxMQ$G$-$k!#

#3 %"%W%l%C%H$N3+;O;~$K%9%l%C%I!&*%V%8%'%/%H$r3+;O$9$k!#
3lKh$j run %a%=%C%I$,<B9T5l$k!#

#4 run %a%=%C%I$O!"%9%l%C%I$NMWG"$j!"=hM}$7$?$$FbMF$r5-=R$9$k!#

#5 %"%W%l%C%H$N=*N;;~$K%9%l%C%I$rDd;_$7!"GK4~9k5!G=$r;}$A$^$9!#stop() %a%=%C%I$,$J$<I,MW$JN+$H$$$&$H!"%"%W%l%C%H$N<B9T$,=*N;$7$?;~E@$G$O!"%W%m%0%i%`$O=*N;$9$k$,!"%9%l%C%I$K$O!"=*N;L?Na$,=P$F$$$J$$!#stop() $O!"=*N;$7$?%W%m%0%i%`$GF0:n$7B3$1$F$$$k%9%l%C%I$rDd;_$5$;$k!#

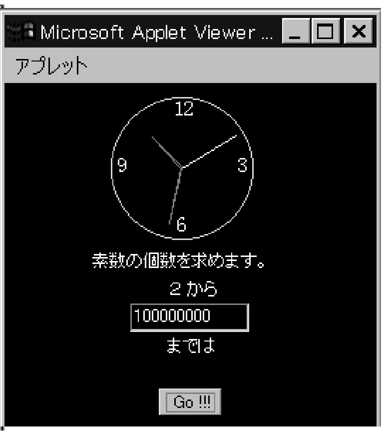
3.2 %"%J%m%0;~7W$HAG?t$N7W;;(%9%l%C%I$r#1$D$@$1;HMQ7?;~)

0J2<$N#3$D$N%"%W%l%C%H$G$O!"%"%J%m%0;~7W$NI=8=$H!";XDj$5l?HO0OFbGNAG?t$N8D?t$r5aak7W;;$r!"9T$C$F$$$k!#

%"%W%l%C%H$N>e$NItJ,G"$k%"%J%m%0;~7W$K$O!"%9%l%C%I$r;HCF$$$k!#%"%W%l%C%H$N2<$NItJ,G"$kAG?t$N7W;;$O!"%9%l%C%I$r;HCF$$$J$$%7%s%0%k%9%l%C%I$N%W%m%0%i%`$G$"$k!#

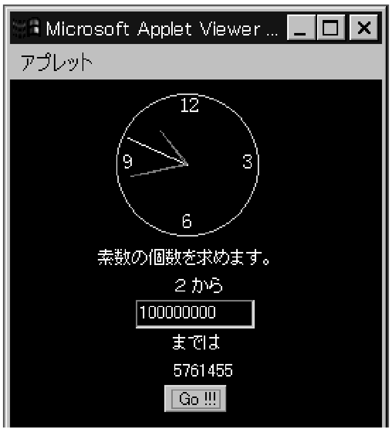
素数の個数を求めます。
2から
100000000
までは

?^6: AG?t$N7W;;3+;O



素数の個数を求めます。
2から
100000000
までは

?^7: 7W;;Cf



素数の個数を求めます。
2から
100000000
までは
5761455

?^8: 7W;;=*N;

%"%W%l%C%H$N>e$NItJ,$N;~7W$O!";~9o$r9o$s$G$$$k!#2<$NItJ,$G$O!";XDj$5l?HO0OFbGNAG?t$N8D?t$r5aak7W;;r7h&H7$F$$$k!#

3NNcGO!"#2$+$i#12/$^$G$N;~$N!"8D?t$r5a$ah&H7$F$$$k!#!VGo !!!!W$r2!$9$H!"AG?t$N7W;;$r3+;O$9$k!#(?^6;2>H)

!VGo !!!!W$r2!$7!"AG?t$N8D?t$r5aak7W;;$r<B9T$7$F$$$kESCfG"$k!#$3$N7W;;Cf$N;~$N%"%J%m%0;~7W$O!"?^#2$HHf3S$9kHJ,$+$kh&$K!";_$^CF$$$FF0$$$F$$$^$;$s!#(?^7;2>H)

AG?t$N8D?t$,=PNO5l!"5761455 $HI=<($5lF$$$k!#>e$NItJ,$G$O!";_$^CF$$$?;~7W$,$^$?!"F0$-=P7F$$$k!#(?^8;2>H)

3.3 %"%J%m%0;~7W$H**StopWatch**(%9%l%C%I$r#2$D;HMQ$7$?;~)

0J2<$N#2$D$N%"%W%l%C%H$G$O!"StopWatch $H;~7W$rI=8=7F$$$k!#

%"%W%l%C%H$N>e$NItJ,G"$k%"%J%m%0;~7W$K!"%9%l%C%I$r;H$C$F$$$k!#%"%W%l%C%H$N2<$NItJ,G"$kStopWatch Kb!"%9%l%C%I$r;HCF$$$k!#

3N%"%W%l%C%H$O!"%^%k%A%9%l%C%I$N%W%m%0%i%`G"$k!#

Stop Watch 00 分 00 秒 0

アプレットは、開始しました。

?^9: Start $r2!$9A0

Stop Watch 10 分 35 秒 8

アプレットは、開始しました。

?^10: Start $r2!$7$F#1#0J,#3#5IC#87P2a8e

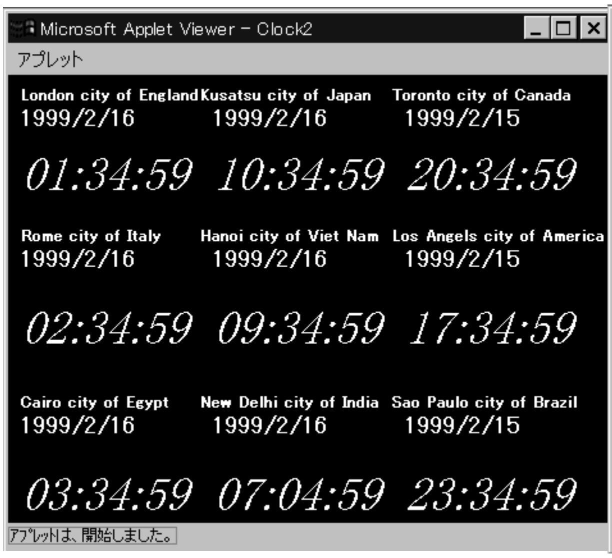
%"%W%l%C%H$N>e$NItJ,$N;~7W$O!";~9o$r9o$s$G$$$k!#2<$NItJ,$OStopWatch $G!"!VStart!W%\%?%s$r2!9HStopWatch $,F0$-=P$9!#!VStop!W%\%?%s$r2!9H!"StopWatch $,Dd;_$9$k!#!VReset!W%\%?%s$r2!9H!"StopWatch $,%j%;%C%H$5lk!#8=:_!"StopWatch $OF0$$$F$$$^$;$s!#(?^9;2>H)

StopWatch $N!VStart!W%\%?%s$r2!7F$+$i!"#1#0J,#3#5IC#87P2a8eG"$k!#%"%W%l%C%H$N>e$NItJ,$N;~7W$H!"2<$NItJ,$NStopWatch $K!"$=l>$l%9%l%C%I$r;HCF$$$k$?$a!"F1;~$KF0$$$F$$$k!#(?^10;2>H)

3.4 #9DNET;T$N;~9o(%9%l%C%I$,#1DN>l9g$H#9$D$N>l9g)

0J2<$N%"%W%l%C%H$G$O!"#9$D$NET;T$N3FET;TL>!"F|IU!";~9o$rI=8=$7$F$$$k!#

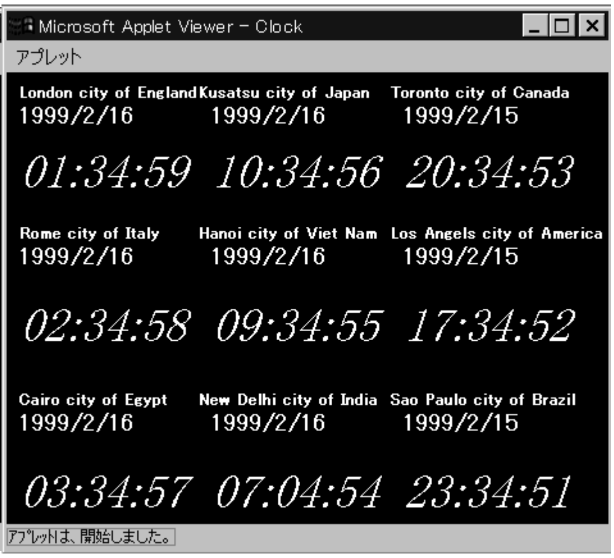
:8B&$N%"%W%l%C%H$G$O!"#9$D$NET;T$N;~9o$r!"#1$D$N%9%l%C%I$r;HC?%7%s%0%k%9%l%C%I$GI=8=$7$F$$$k!#1&B&$N%"%W%l%C%H$G$O!"#9$D$NET;T$N;~9o$r!"$=l>$l#9$D$N%9%l%C%I$r;HC?!"%^%k%A%9%l%C%I$GI=8=$7$F$$$k!#



London city of England 1999/2/16 01:34:59
Kusatsu city of Japan 1999/2/16 10:34:59
Toronto city of Canada 1999/2/15 20:34:59
Rome city of Italy 1999/2/16 02:34:59
Hanoi city of Viet Nam 1999/2/16 09:34:59
Los Angels city of America 1999/2/15 17:34:59
Cairo city of Egypt 1999/2/16 03:34:59
New Delhi city of India 1999/2/16 07:04:59
Sao Paulo city of Brazil 1999/2/15 23:34:59

アプレットは、開始しました。

?^11: %9%l%C%I$r1 8D;H$C$?;~7W



London city of England 1999/2/16 01:34:59
Kusatsu city of Japan 1999/2/16 10:34:56
Toronto city of Canada 1999/2/15 20:34:53
Rome city of Italy 1999/2/16 02:34:58
Hanoi city of Viet Nam 1999/2/16 09:34:55
Los Angels city of America 1999/2/15 17:34:52
Cairo city of Egypt 1999/2/16 03:34:57
New Delhi city of India 1999/2/16 07:04:54
Sao Paulo city of Brazil 1999/2/15 23:34:51

アプレットは、開始しました。

?^12: %9%l%C%I$r9 8D;H$C$?;~7W

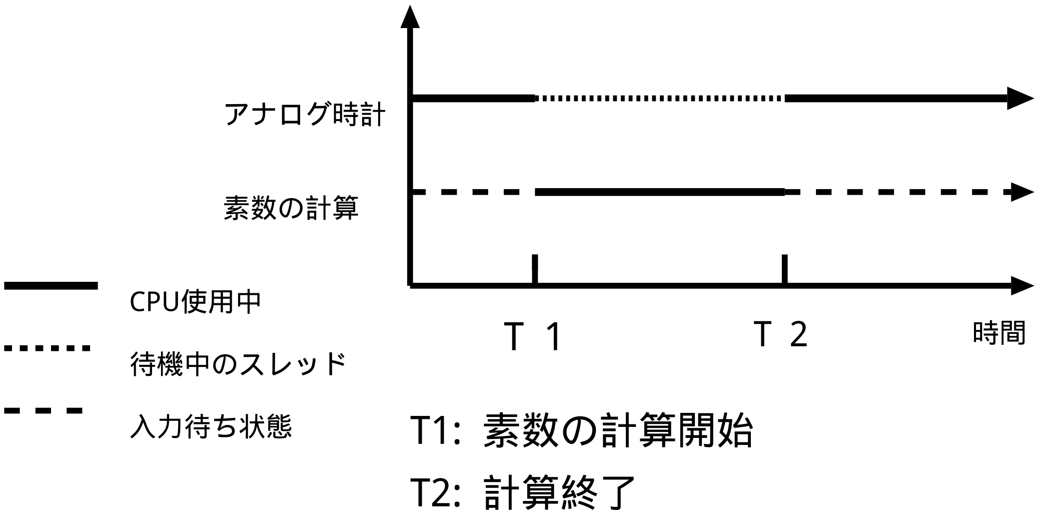
#9DNET;T$,$"k,!"%9%l%C%I$r#1$D7+;HCF$$$J$$$?$a!"$=l>lNET;T$N;~9o$NIC?K$N?J$aJ}rJQ(k3H,=PMh$:!"$9YF$NET;T$G!"#1IC$:$D99?7$9$kh&KJCF$$$k!#(?^11;2>H)

ET;T$N;~9o$NIC?KK=1>$1! "%9%1%C%I$r#1D:$D;H$G$F$$$k! #3N$?$a! "$=$1$>$1$NET
;T$N;~9o$NIC?K$N9 9?7$N;EJ}$r! "<+M3$KJQ99$9$k;v$,=PMh$k! #3NNcGO! "#9DNET;T$NIC
?K$N9 9?7$N;EJ}$r! "!VLondon!W$O! "#1IC$:$D9 9?7! #!VRome!W$O! "#2IC$:$D9 9?7! #!VCairo!W$O! "
#3IC$:$D9 9?7! #!VKusatsu!W$O! "#4IC$:$D9 9?7! #!VHanoi!W$O! "#5IC$:$D9 9?7! #!VNew Delhi!W
$O! "#6IC$:$D9 9?7! #!VToronto!W$O! "#7IC$:$D9 9?7! #!VLos Angels!W$O! "#8IC$:$D9 9?7! #!VSao
Paulo!W$O! "#9IC$:$D9 9?7$5$1$kh&KJCF$$$k! #(?^12;2>H)

4 %9%l%C%I%W%m%0%i%`$NI>2A

4.1 %7%s%0%k%9%l%C%IKD$$$F

#3. #2$N7k2L$r%0%i%UI=<(9k$H!"

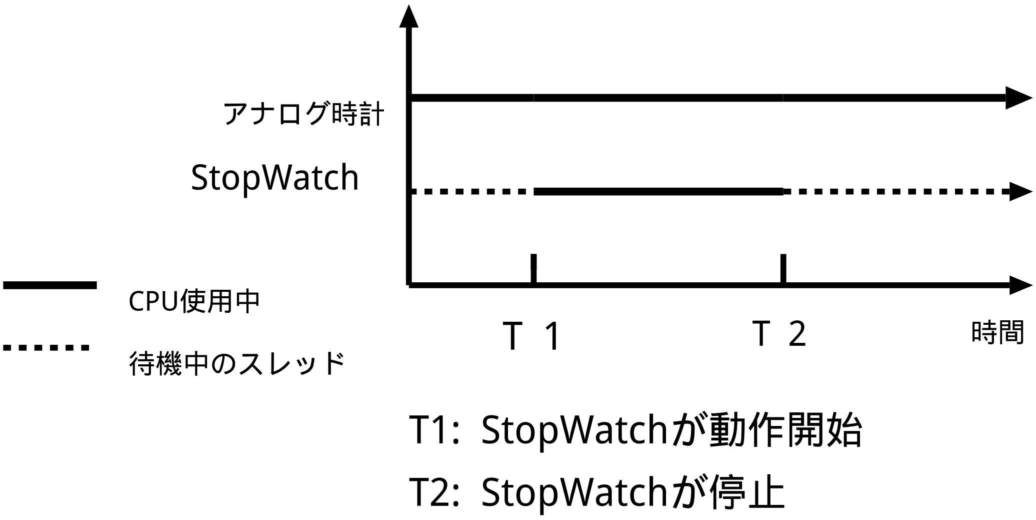


?^13: %7%s%0%k%9%l%C%I$N>uBV

%7%s%0%k%9%l%C%IN?$a!"CPU $r6&M-$9$k;v$,G-$:!"?^13$N>l9gGO!"T1!"T2 $r6-$K!"%"%J%m%0;~7W$HAG?t$N7W;;NIAi$+$,!";HMQ9k>uBVKJCF$$$k!#

4.2 %^%k%A%9%l%C%IKD$$$F

#3. #3$N7k2L$r%0%i%UI=<(9k$H!"



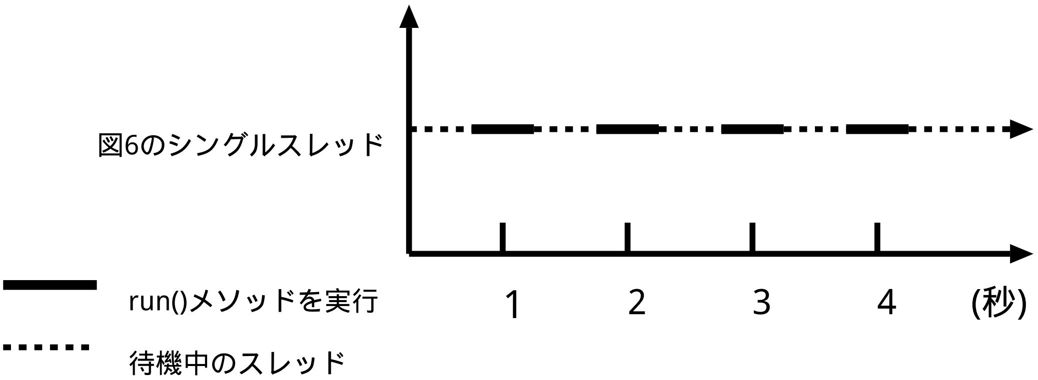
?^14: %^%k%A%9%l%C%I$N>uBV

T1 $r6-$KStopWatch $,F0$-=P$7!"%"%J%m%0;~7W$HF1;~$K<B9T$7$F$$$k;~4V$,$"k,!"%^%k%A%9%l%C%I2=$,$5lF$$$k$?$a!"IAibF0:n=PMh$F$$$k!#

4.3 %7%s%0%k%9%l%C%I$H%^%k%A%9%l%C%I

4.3.1 %7%s%0%k%9%l%C%I$N;~

?^11$N>uBV$r%0%i%UI=<(9k$H!"

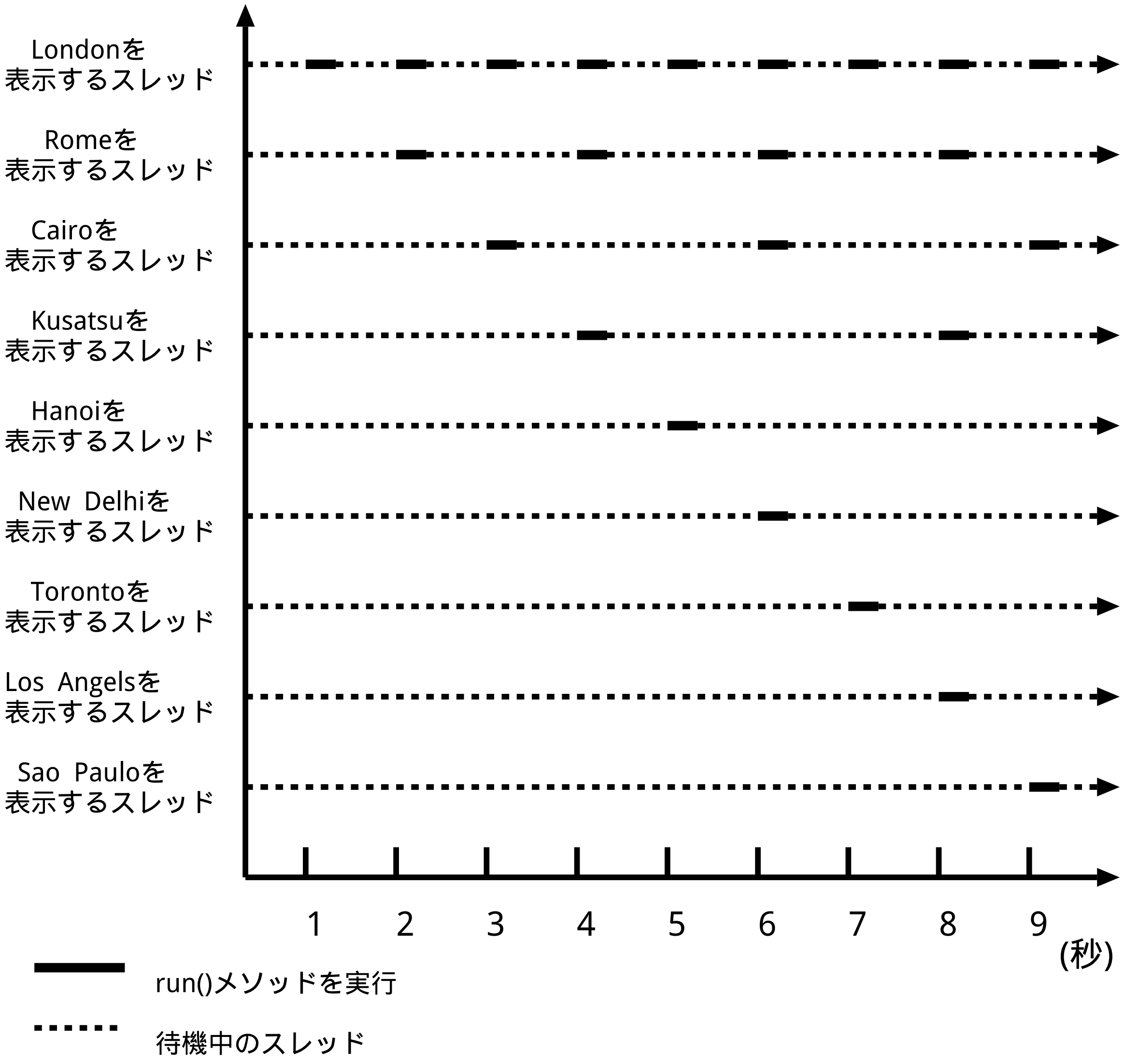


?^15: %9%l%C%I$Nrun() %a%=%C%I$N<B9T;~

;~7W$O#98D$"k,!"%9%l%C%I$O#1$DN?$a!"$9YF$N;~7W$G#1IC$:$Drun %a%=%C%I$r5/F0$7!"99?7$7$F$$$k!#3N$?$a!"$"$k;~7W$r#1IC$:$D99?7!"$"$k;~7W$r#2IC$:$D99?7$9$k$H$$$&JL!9$NF0:n$O=PMh$:!"F1$8F0:n7+=PMh$J$$!#

4.3.2 %^%k%A%9%l%C%I$N;~

?^12$N>uBV$r%0%i%UI=<(9k$H!"



?^16: 3F%9%l%C%I$Nrun() %a%=%C%I$N<B9T;~

; ~7W$O# 98D$ "$ j! "% 9% 1%C%I$ r# 1D :$D; HMQ$ 7F $$k$?$a! "run() %a%=%C%I$ r$=$ 1$>$ 1JL! 9 $K5/F0=PMh$k! #?^12$N>19g$G$O! "! London ! W$rI=< (9k%9%1%C%I$O! "#1IC$*$-$Krun() %a %=%C%I$r5/F0! #! Rome ! W$rI=< (9k%9%1%C%I$O! "#2IC$*$-$Krun() %a%=%C%I$r5/F0! #! Cairo ! W $rI=< ($9$k%9%1%C%I$O! "#3IC$*$-$Krun() %a%=%C%I$r5/F0! #! Kusatsu ! W$rI=< ($9$k%9%1%C%I $O! "#4IC$*$-$Krun() %a%=%C%I$r5/F0! #! Hanoi ! W$rI=< (9k%9%1%C%I$O! "#5IC$*$-$Krun() %a%=%C%I$r5/F0! #! New Delhi ! W$rI=< (9k%9%1%C%I$O! "#6IC$*$-$Krun() %a%=%C%I$r5/F0! # ! Toronto ! W$rI=< (9k%9%1%C%I$O! "#7IC$*$-$Krun() %a%=%C%I$r5/F0! #! Los Angels ! W$rI= < (9k%9%1%C%I$O! "#8IC$*$-$Krun() %a%=%C%I$r5/F0! #! Sao Paulo ! W$rI=< (9k%9%1%C%I $O! "#9IC$*$-$Krun() %a%=%C%I$r5/F0$H#1$D#1$DJL! 9$K9 9? 7$7F $$k! #

5 $*$ojK

K\8&5fGO!"Java $rMQ$$$?%^%k%A%9%l%C%I%W%m%0%i%_%s%0KD$$$F=RYF$-$?!#%9%l%C%IHO$$$G$?$$$INMMJbN$+!#%9%l%C%I$r#1D@$1;H$G$?%7%s%0%k%9%l%C%I!"%9%l%C%I$rJ#?t;H$G$?%^%k%A%9%l%C%I$K$D$$$F!"%W%m%0%i%`$KM?$($k1F6A$K$D$$$F=R$Y!"$3$N%9%l%C%I$rJava %W%m%0%i%`KINh$&$K3h$+$7$F$$$/N+KD$$$F!"8!>Z7F$$$k!#

Java 8@8l$G%W%m%0%i%`$r=q$$$?0u>]$G$O!"8@8l<+?H$K%9%l%C%I$,%5%]!<%H$5$l$F$$$k$3$H$b$"$j!"%9%l%C%I$r;HMQ$7$J$$$H!"%W%m%0%i%`$NI}$r9-$/9k3H$,=PMh$J$$$H!"46$8$F$$$k!#

B>$N8@8l$G%9%l%C%I$r;HMQ$9$k5!2q$,>/$J$$$H$$$&;vb"$j!"Java 8@8l$G%9%l%C%I%W%m%0%i%`$r=q$/3H$K!"Fq$7$=$&$H$$$&@hF~4Q$r;}$?lk$+$b7l$J$$!#$@$,!"8@8l<+?H$O%7%s%W%k$G$"$j!"%9%l%C%IBP1~8@8lJN$G!";HMQ$7F_lP!"Java 8@8lKOL5$/$FOJiJ$$5!G=G"$k!#

:#8e$N2]Bj$H7F$O!"Java 8@8l$G$N%W%m%0%i%`$O!"%"%W%l%C%H$H%M%C%H%o!<%/$NJ,LnKJLl$F$$$k$H;W$&$,!"$3$3$G$O!"%"%W%l%C%H$G$N%9%l%C%I%W%m%0%i%_%s%0$,<gKJCF$$$F!"%M%C%H%o!<%/J,LnGN%9%l%C%I%W%m%0%i%_%s%0$O!"?($lil$F$$$J$$!#hC$F!":#8e$O%M%C%H%o!<%/J,LnGN%9%l%C%I$NF0:n>u67$K$D$$$F$bD4:::$7$F$$$/M>CO$,$"$k!#

A IUO?

A.1 :n@.%W%m%0%i%`$N30It;EMM

A.1.1 %"%J%m%0;~7W$HAG?t$N7W;;KD$$$F

素数の個数を求めます。

2 から

100000000

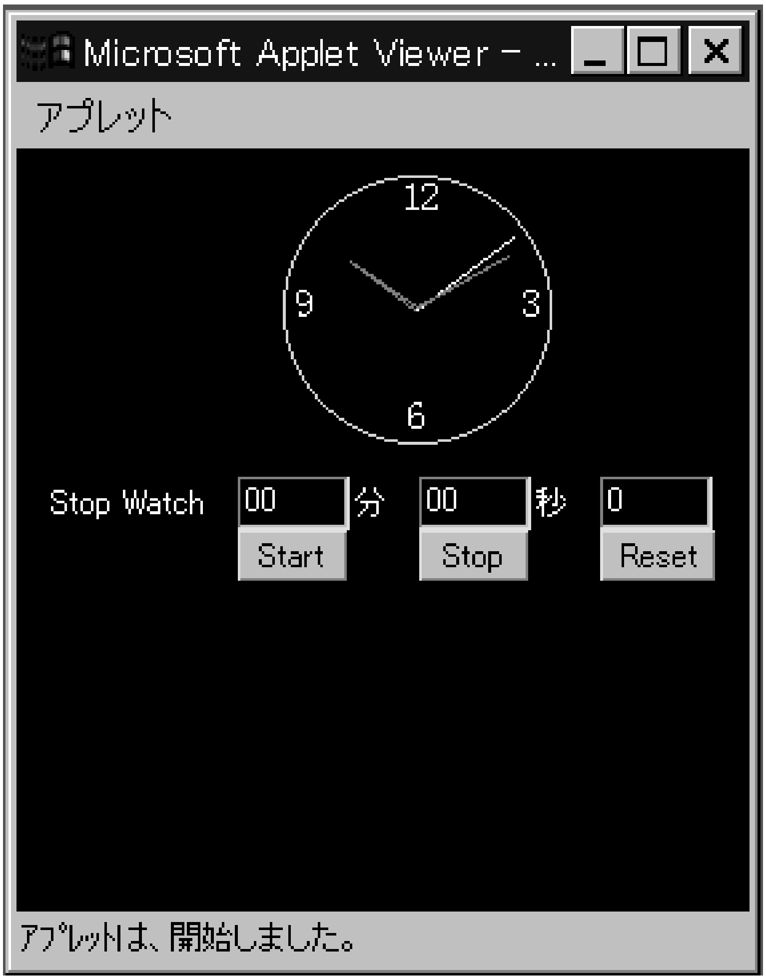
までは

?^17: %"%J%m%0;~7W$HAG?t$N7W;;

%"%W%l%C%H$N>e$NItJ,$N;~7W$O!";~9o$r9o$s$G$$$k!#2<$NItJ,$G$O!";XDj$5l?HO0OFbGNAG?t$N8D?t$r5aak7W;;r9$k!#

;~7W$O!"$3$N?^$G$O!"10;~12J,32IC$r;X7F$$$k!#AG?t$N7W;;$O!"2<8B$O;XDj$G$-$J$$$,!">e8B$O<+M3$K@_DjG-$k!#%\%?%s!VGo !!!!W$r2!9H!"7W;;$r3+;O$9$k!#

A.1.2 %"%J%m%0;~7W$H**StopWatch** KD$$$F

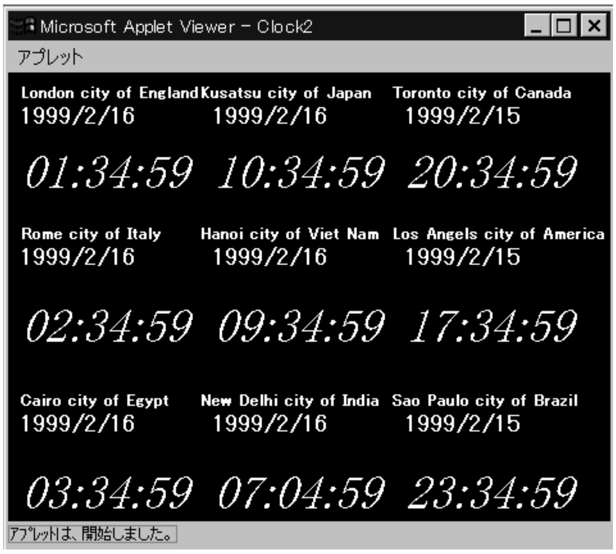


アプレットは、開始しました。

?^18: %"%J%m%0;~7W$HStopWatch

%"%W%l%C%H$N>e$NItJ,$N;~7W$O!";~9o$r9o$s$G$$$k!#2<$NItJ,$O!"StopWatch G"$k!# ;~7W$O!"3N?^GO!"10 ;~10 J,12 IC$r;X$7$F$$$k!#StopWatch $O!"!VStart!W%\%?%s$r2!9HStopWatch $,F0$-=P$9!#!VStop!W%\%?%s$r2!9H!"StopWatch $,Dd;_$9$k!#!VReset!W%\%?%s$r2!9H!"StopWatch $,%j%;%C%H$5lk!#

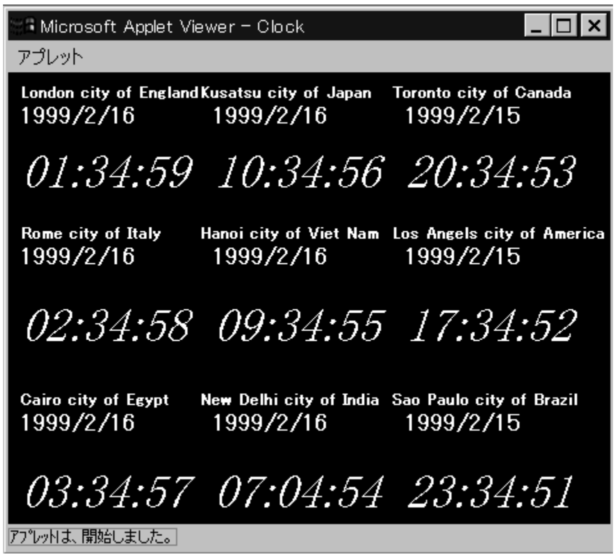
A.1.3 #9DNET;T$N;~9o$K$D$$$F



London city of England 1999/2/16 01:34:59
Kusatsu city of Japan 1999/2/16 10:34:59
Toronto city of Canada 1999/2/15 20:34:59
Rome city of Italy 1999/2/16 02:34:59
Hanoi city of Viet Nam 1999/2/16 09:34:59
Los Angels city of America 1999/2/15 17:34:59
Cairo city of Egypt 1999/2/16 03:34:59
New Delhi city of India 1999/2/16 07:04:59
Sao Paulo city of Brazil 1999/2/15 23:34:59

アプレットは、開始しました。

?^19: %9%l%C%I$r1 8D;H$C$?;~7W



London city of England 1999/2/16 01:34:59
Kusatsu city of Japan 1999/2/16 10:34:56
Toronto city of Canada 1999/2/15 20:34:53
Rome city of Italy 1999/2/16 02:34:58
Hanoi city of Viet Nam 1999/2/16 09:34:55
Los Angels city of America 1999/2/15 17:34:52
Cairo city of Egypt 1999/2/16 03:34:57
New Delhi city of India 1999/2/16 07:04:54
Sao Paulo city of Brazil 1999/2/15 23:34:51

アプレットは、開始しました。

?^20: %9%l%C%I$r9 8D;H$C$?;~7W

?^19!"?^206&$K!"#9$D$NET;T$N3FET;TL>!"F|IU!";~9o$rI=8=$7$F$$$k!##9DNET;TL>$O!"!VLondon!W"!VRome!W"!VCairo!W"!VKusatsu!W"!VHanoi!W"!VNew Delhi!W"!VToronto!W"!VLos Angels!W"!VSao Paulo!WG"$k!#

A.2 :n@.%W%m%0%i%`$NFbIt;EMM

A.2.1 %"%J%m%0;~7W$HAG?t$N7W;;KD$$$F

```
public class sosuu2 extends Applet implements Runnable{
     !&Runnable %$%s%?!<%U%'!<%9$r<BAu!#

public void init() { }
     !&?'!"0LCV$rDj5A

public void plotpoints(int x0, int y0, int x, int y, Graphics g) {}
public void circle(int x0, int y0, int r, Graphics g) {}
public void paint(Graphics g) {}
     !&%"%J%m%0;~7W$NDj5A

public void start() {}
```

!& %9%l%C%I !&*%V%8%'%/%H$r3+;O$9$k

```
public void stop() {}
```

!&%"%W%l%C%H$N=*N;;~$K%9%l%C%I$rDd;_

```
public void run() {}
```

!&AG?t$NF0:n$r5-=R

```
int sob(int n) {}
```

!&AG?t$N8D?t$r7W;;

A.2.2 %"%J%m%0;~7W$H**StopWatch** KD$$$F

```
public class Stop extends Applet implements Runnable{
```

!&Runnable %$%s%?!<%U%'!<%9$r<BAu!#

```
public void init() { }
```

!&0LCV$rDj5A

```
public void plotpoints(int x0, int y0, int x, int y, Graphics g) {}
public void circle(int x0, int y0, int r, Graphics g) {}
public void paint(Graphics g) {}
```

!&%"%J%m%0;~7W$NDj5A

```
public void start() {}
```

!& %9%l%C%I !&*%V%8%'%/%H$r3+;O$9$k

```
public void stop() {}
```

!&%"%W%l%C%H$N=*N;;~$K%9%l%C%I$rDd;_

```
public void run() {}
```

!&Stopwatch $NF0:n$r5-=R

```
public boolean action( Event e , Object arg ){}
```

!&Stopwatch $N%\%?%s$N@)8f

A.2.3 #9DNET;T$N;~9o$K$D$$$F

```
public class Clock extends Applet implements Runnable{
```

!&Runnable %$%s%?!<%U%'!<%9$r<BAu!#

```
public void init() { }
```

!&G[?'$rDj5A

```
public void start() {}
```

!& %9%l%C%I !&*%V%8%'%/%H$r3+;O$9$k

```
public void paint(Graphics g){}
```

!& ET;TL>!"F|IU!";~9o$rDj5A

```
public void run() {}
```

!&AG?t$NF0:n$r5-=R

```
public void stop() {}
```

!&%"%W%l%C%H$N=*N;;~$K%9%l%C%I$rDd;_

<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!#

; 29MJ88 %

[1] M-2f @.>k!"1RF# IR<w!": 4F# <#!"Gr?@ 015W!"@>B< Mx9@!"B<>e Ns !JAVA F~Lg, fF 1K<R(1996).

[2] ?"ED N6CK : JAVA <B@o9V:B, %"%9%-!<(1996).

[3] David Flanagan : %/%$%C%/%j%U%!%l%s%9, %*!<%`<R(1996).

[4] M-2l L/;R, C]2, >0;0 : Java %W%m%0%i%_%s%0E0D1%^%9%?!<, %=%U%H%P%s%/(1998).

[5] MarkC.Chan, StevenW.Griffith, AnthonyF.Iasi : Java %W%m%0%i%_%s%01001Tips, %*!<%`<R(1997).

[6] Scott Oaks,Henry Wong:Java %9%l%C%I%W%m%0%i%_%s%0, %*%i%$%j!<%8%c%Q%s(1997).

[7] %m!<%i%j%a%$, %A%c!<%k%:L %Q!<%-%s%: : Java 8@81F~Lg, %H%C%Q%s(1996).

[8] 8M>> K-OB : Java %W%m%0%i%`%G%6%$%s, %=%U%H%P%s%/(1998).

[9] Peter van der Linden : %8%c%9%HJAVA, %"%9%-!<(1997).

[10] ?@5H C#O: : Java %W%m%0%i%_%s%0F~Lg, %*!<%`<R(1996).

[11] @P@n @5?M !'Java $rMQ$$$?%=!<%F%#%s%0%"%k%4%j%:%`$N2D;k2=, N)L?4 [Bg3XM}9)3X It>pJs3X2JB46HO@J8(1998).