BUILD THE HTML PAGE

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```
<!DOCTYPEHTMLPUBLIC"//W3C//DTDHTML4.01//EN"
"http://www.w3.org/TR/html4/strict.dtd">

                                        <html>

                                        <head>

                                                <metahttp-equiv="Content-
                                          Type"content="text/html;charset=UTF-8">

                                              <title>Artificialintelligence:OpenKore
                                        sourcecodedocumentation</title>

                                    <linkrel="stylesheet" type="text/css"href="openkore.css">

                                                        <!--FixbrokenPNGtransparencyforIE/Win5-6+-
                                        ->

                                               <!--[ifgteIE5.5000]>

                                              <script
                                        type="text/javascript"src="pngfix.js"></scri pt>

                                               <![endif]-->


                                               <styletype="text/css">

                                              <!--

                                               .example{margin:

                                                   0.3cm;marginleft:0.5cm;

                                              }

                                               .comment{font-

                                                    style:italic;

                                              }
```

```
        .term{border-bottom:1px dottedblack;
        }
        .cstr{color:
                #007700;
        }
        -->
        </style>
</head>

<body>

<divid="title">OpenKoresourcecodedocumentation</div>

<divid="navigation">
        <ul>
        <li><ahref="http://openkore.sourceforge.net/">Mainwe bsite</a></li>
        <li><ahref="index.html">Table ofcontents</a></li>
        <li><b>Artificialintelligence</b></li>
        </ul>
</div>

<divid="main">

<h1>HowtheAIsubsystemisdesigned</h1>
TheAIsubsystemisn'treallycomplex,butitcouldtakeawhileto understandit'sdesign.

<p>
All"intelligence"ishandledinsidethe
```

<code>AI()</code>function(rightnowit'sone
bigfunctionbutwehopetosplititinthefuture).

Asexplainedinthe<a>Mainloop&amp;initialization</a>page,
the<code>AI()</code>functiononlyrunsless thanafractionofasecond.

<p>

Basically,theAItellsKoretodocertainthingsbasedonthecurrent
situation.I'lltrytoexplainitwithsomeexamples.

<aname="ex1"></a>

<h2>Example1:Randomwalk</h2>

You'reprobablyfamiliarwithKore'srandomwalkfeature.

IftherearenomonstersandKoreisn'tdoinganything,itwillwalk
toarandomspotonthemap,andattack anymonstersitencounters.

Thefollowingpieceofcode(withinthe
<code>AI()</code>functionmakesKorewalktoarandomspotif
itisn'tdoinganything:

<preclass="example">

```
<spanclass="comment">#####RANDOM
WALK#####</span>
<b>if</b>($config{'route_randomWalk'}&&
$ai_seq[0]
<b>eq</b>""&&@{$field{'field'}}>1&& !$cities_lut{$field{'name'}.'.rsw'}){
<spanclass="comment">#Finda
randomblockonthemapthatwecan walkon</span>
<b>do</b>{
$ai_v{'temp'}{'randX'}=int(rand()
*($field{'width'}-1));
$ai_v{'temp'}{'randY'}=int(rand()
*($field{'height'}-1));
7                          }
<b>while</b>($field{'field'}[$ai_v{'temp'}{'randY'}*$field{'width'}+
$ai_v{'temp'}{'randX'}]);8

9                          <spanclass="comment">#Moveto
                           thatblock</span>

10                         message<span
                           class="cstr">"Calculatingrandomrouteto:
$maps_lut{$field{'name'}.'.rsw'}($field{'name'}):
$ai_v{'temp'}{'randX'},$ai_v{'temp'}{'randY'}\n"</span>,
<spanclass="cstr">"route"</span>;

11                         ai_route(\%{$ai_v{'temp'}{'returnHash'}},

12                         $ai_v{'temp'}{'randX'}, 13     $ai_v{'temp'}{'randY'},

14                         $field{'name'},

15                         0,

16                         $config{'route_randomWalk_maxRouteTime'},

17                         2,

18                         undef,

19                         undef,

20                         1);

21                         }
```

</pre>

Wecallthisblockofcodean<emclass="term">AI codeblock</em>.

Inotherwords,anAIcodeblockis<em>anentire blockofcodewhichdealswithacertainpartoftheAI</em>.

<h3>Situation check</h3>Inline1,it

checks:

<ol>

<li>whetherthe configurationoption <code>route_randomWalk</code>ison</li>

<li>whethertherearecurrentlynootheractive
<emclass="term">AIsequences</em>(seebelow)</li>

<li>whetherwe'recurrentlyNOTinacity</li>

</ol>

Ifalloftheaboveistrue,thenKorewillrunthecodeinside thebrackets.

<p>

Whatisan<emclass="term">AIsequence</em>?Itis
avaluewithinthe<code>@ai_seq</code>array.

Thisarrayisa<em>commandqueue</em>.

<p>

AIcodeblocksprependvaluesintothisarraysothey
canknowwhenit'stheirturntodosomething.

WhenanAIcodeblockisdonewithit'stask,itwillremove thatvaluefromthearray.

So,if<code>@ai_seq</code>isempty,thenthatmeansallAI
codeblockshavefinishedandKoreisn'tdoinganythingelse.

AndthisiswhentherandomwalkAIcodeblockjumpsin.

<p>

Thereisalsothe<code>@ai_seq_args</code>array,usedto
storetemporaryvariablesusedbythecurrentAIcodeblock.

Ifavalueisprependedinto<code>@ai_seq</code>,thenavalue
mustalsobeprependedinto <code>@ai_seq_args</code>.Mo reonthislater.

<h3>Findingarandompositiontowalkto</h3>

Line4-7triestofindarandompositioninthemap thatyoucanwalkon.

(<code>$field{field}</code> is a reference to an arraywhichcontainsinformationaboutwhichblocksyoucanandcan't walkon.

Butthat'snotimportantinthisexample.Youjust havetounderstandwhatthisblockdoes.)

<p>

Theresultcoordinateisputintothesetwovariables:

<ul>

<li><code>$ai_v{temp}{randX}</code></li>

<li><code>$ai_v{temp}{randY}</code></li>

</ul>

<small>(Incaseyoudidn'tknow, <code>$foo{bar}</code>isthesameas<code>$foo{'bar'}</code >.)</small>

<h3>Moving</h3>

Line11-20isthecodewhichtellsKoretomovetotherandom position.

Ittells<code>ai_route()</code>whereitwantstogoto.

<code>ai_route()</code>prependsa<code>"route"</code>AI sequencein<code>@ai_seq</code>,andargumentsinahash

(which is then prepended into <code>@ai_seq_args</code>andimmediatelyreturns.

Shortlyafterthis,theentire<code>AI()</code>functionreturns.

Thepointis,<code>ai_route()</code>is <em>notsynchronous</em>.

<p>

Inlessthanafractionofasecond,the <code>AI()</code>functioniscalledagain.

Becausethe<code>@ai_seq</code>variableisnot

emptyanymore,therandomwalkAIcodeblockisneveractivated

(theexpression<code>'$ai_seq[0]eq""'</code>isfalse).

<p>

TheAIcodeblockthathandlesroutingiselsewhere inthe<code>AI()</code>function.

Itseesthatthefirstvaluein<code>@ai_seq</code>is
<code>"route"</code>,andthinks<em>"hey,nowit'smyturntodo
something!"</em>.

(TherouteAIcodeblockisverycomplexsoI'mnotgoingtoexplain
whatitdoes,butyougettheidea.)

WhentherouteAIcodeblockhasfinished,itwillremovethefirst
itemfrom<code>@ai_seq</code>.

If<code>@ai_seq</code>isempty,thentherandom
routeAIcodeblockisactivatedagain.

<h2>Example2:Attackingmonsterswhilewalkingto arandomspot</h2>

YoumightwanttowonderhowKoreisabletodeterminewhethertoattack
monsterswhenit'swalking.

Let'stakealookatasmallpieceofit'ssourcecode:

<preclass="example">

```
                <spanclass="comment">#####AUTO-ATTACK#####</span>


    <b>if</b>(($ai_seq[0]<b>eq</b>
<spanclass="cstr">""</span>||$ai_seq[0]<b>eq</b>
<spanclass="cstr">"route"</span>||$ai_seq[0]<b>eq</b>
<spanclass="cstr">"route_getRoute"</span>||$ai_seq[0]
<b>eq</b><spanclass="cstr">"route_getMapRoute"</span>
||$ai_seq[0]<b>eq</b> <spanclass="cstr">">"follow"</spa
n>

            ||          $ai_seq[0]          <b>eq</b>
```

```
                 <spanclass="cstr">"sitAuto"</span>||$ai_seq[0]<b>eq</b>
              <spanclass="cstr">"take"</span>||$ai_seq[0]<b>eq</b>
<spanclass="cstr">"items_gather"</span>||$ai_seq[0]
<b>eq</b><spanclass="cstr">"items_take"</span>) ...
```

</pre> Asyoucanseehere,theauto-attackAIcodeblockisrunifanyof theaboveAIsequencesareactive.

SowhenKoreiswalking(<code>$ai_seq_args[0]</code> is"route"),Korecontinuestocheckformonsterstoattack.

<p>

Butasyoumayknow,ifyoumanuallytype"moveWhateEverMapNam

e"intheconsole,Korewillmovetothatmapwithoutattacking

monsters(yes,thisisintentionalbehavior).Whyisthat?

<p>

Asseeninexample1,the
<code>ai_route()</code>functioninitializesthe routeAIsequence.

Thatfunctionacceptsaparametercalled"attackOnRoute".
<code>$ai_seq_args[0]{attackOnRoute}</code>issetto
thesamevalueasthisparameter.

Korewillonlyattackmonsterswhilemoving,if thatparameterissetto1.

Whenyoutype"move"intheconsole,thatparameterissetto 0.The
randomwalkAIcodeblockhoweversetsthatparameterto1.

<p>

Insidetheauto-attackAIcodeblock,Korecheckswhetherthe

argumenthashthat'sassociatedwiththe"route"AIsequencehasa

'attackOnRoute'key,andwhetherthevalueis1.

<preclass="example"> ...

```
        $ai_v{'temp'}{'ai_route_index'}=binFind(\@ai_seq,
<spanclass="cstr">"route"</span>); <b>if</b>($ai_v{'temp'}{'ai_route_index'}ne
<spanclass="cstr">""</span>){

                $ai_v{'temp'}{'ai_route_attackOnRoute'}=
```

$ai_seq_args[$ai_v{'temp'}{'ai_route_index'}]{'attackOnRoute'};

        }

        ...

        <spanclass="comment">#SomewhereelseintheautoattackAIcodeblock,Kore checkswhether

        #$ai_v{'temp'}{'ai_route_attackOnRoute'}isset to1.</span>

</pre>

<h2>Timeouts:Towaitawhilebeforedoingsomething</h2>

Incertaincasesyoumaywanttheprogramtowaitawhilebefore doinganythingelse.

Forexample,youmaywanttosenda"talktoNPC"packettotheserver,th ensenda"chooseNPCmenuitem2"packet 2secondslater.

<p>

Thefirstthingyouwouldthinkofisprobablytousethe <code>sleep()</code>function.

However,thatisabadidea.<code>sleep()</code>blocksthe entireprogram.Duringthesleep,nothingelsecanbeperformed.

Usercommandinputwillnotwork,otherAIsequences arenotrun,networkdataisnotreceived,etc.

<p>

Therightthingtodoistousethe <ahref="Utils.html#timeOut"><code>timeOut()</code></a>function.

TheAPIdocumentationentryforthatfunctionhas twoexamples.Here'sanotherexample,demonstratinghow

you can use the timeOut() function in an AI sequence.ThisexampleinitializesaconversationwithNPC1337(aKa praNPC).

Thentwosecondslater,itsendsa"chooseNPCmenu item2"packet.

<preclass="example">

```
<spanclass="comment">#TheAI()functionisrunin themainloop</span>

<b>sub</b>AI{ ...

        <b>if</b>($somethingHappened){

                <b>my</b>%args;

                   $args{stage}=<spanclass="cstr">'Just
 started'</span>;


                <b>unshift</b>@ai_seq,
<spanclass="cstr">"NpcExample"</span>;

                <b>unshift</b>@ai_seq_args,\%args;


                  $somethingHappened=0;

        }


        <b>if</b>($ai_seq[0]<b>eq</b>
<spanclass="cstr">"NpcExample"</span>){

                   <b>if</b>($ai_seq_args[0]{stage}
<b>eq</b><spanclass="cstr">'Juststarted'</span>){

                        <spanclass="comment">#ThisAI

  sequencejuststarted

                                #Initializeaconversationwith
NPC1337</span>

                        sendTalk($net,1337);


                        <spanclass="comment">#Store
thecurrenttimeinavariable</span>


$ai_seq_args[0]{waitTwoSecs}{time}=<b>time</b>;

                        <spanclass="comment">#We
wanttowaittwoseconds</span>
$ai_seq_args[0]{waitTwoSecs}{timeout}=2;

                                        $ai_seq_args[0]{stage}=
<spanclass="cstr">'Initializedconversation'</span>;

                           }<b>elsif</b>($ai_seq_args[0]{stage}
  <b>eq</b>              <span
class="cstr">'Initializedconversation'</span>

                                    <spanclass="comment">#This
'if'statementisonlytrueiftwosecondshavepassed

                                      #since
$ai_seq_args[0]{waitTwoSecs}{time}isset</span>

                                      &&timeOut(
$ai_seq_args[0]{waitTwoSecs})

                           ){

                                        <spanclass="comment">#
Twosecondshavenowpassed</span>

                                        sendTalkResponse($net,1337,2);

                                        <spanclass="comment">#
We'redone;removethisAIsequence</span> <b>shift</b>@ai_seq;

                                                <b>shift</b>@ai_seq_args;

                           } }

              ...

}

</pre>
```

<h2>Conclusion&amp;summary</h2>

TheentireAIsubsystemiskepttogetherbythese twovariables:

<ul>

<li><code>@ai_seq</code>:aqueuewhichcontains AIsequencenames.

Usually,AIcodeblocksarerunbasedonthevalueofthefirst iteminthequeue

(thoughthisdoesn'thavetobetrue;itdependsonhowtheAI codeblockisprogrammed).</li>

<li><code>@ai_seq_args</code>:containsarguments that'sassociatedwithcurrentAIsequence.</li>

</ul>

Thedesignisprettysimple.Thisallowsthesystemto beveryflexible:

youcandoprettymuchanythingyouwant.There

aren'tmanyreallimitations (butthat'sjustmyopinion).

<p>

The<code>AI()</code>functionrunsonlyveryshortly.SoAIcode blocksshouldn'tdoanythingthatcanblock thefunctionforalongtime.

<h3>Glossary</h3>

<ul>

<li>An<emclass="term">AIcodeblock</em>isanentireblock ofcodewhichdealswithacertainpartoftheAI.</li>

<li>An <em class="term">AI sequence</em> is a valuewithinthe<code>@ai_seq</code>queue(andanassociatedv alueinsidethe<code>@ai_seq_args</code>array).</li>

</ul>

<p><hr><p>

<divid="footer">

<ul>

```
                <li><ahref="http://validator.w3.org/check?uri=referer"
title="ValidHTML
4.01!"><imgsrc="http://www.w3.org/Icons/valid-html401"
alt="ValidHTML4.01!"height="31"width="88"></a></li>

                              <li><ahref="http://www.mozilla.org/products/firefox/"title
="GetFirefox-TakeBacktheWeb"><img
width="104"height="32"src="http://www.mozilla.org/products/firef
ox/buttons/getfirefox_small.png"alt="GetFirefox-TakeBack theWeb"></a></li>

                <li><ahref="http://www.mozilla.org/products/firefox/"title= "If
youwerelookingatthispageinanybrowserbutMicrosoftInternet
Explorer,itwouldlookandrunbetterandfaster"><imgwidth="45"
height="45"src="http://linuxart.com/img/noIE-small.png"alt="If
youwerelookingatthispageinanybrowserbutMicrosoftInternet
Explorer,itwouldlookandrunbetterandfaster"></a></li>

                 </ul>

</div>


</div>


</body>

</html>
```