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## (12) United States Patent

### Doyle

#### (54) METHOD AND APPARATUS FOR IDENTIFYING FEATURES OF MULTIDIMENSIONAL IMAGE DATA IN HYPERMEDIA SYSTEMS

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#### **Related U.S. Application Data**

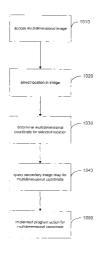
- (63) Continuation of application No. 09/316,496, filed on May 21, 1999.
- (60) Provisional application No. 60/086,620, filed on May 23, 1998.
- (51) Int. Cl.<sup>7</sup> ..... G06F 17/00
- (52) U.S. Cl. ..... 715/501.1; 345/424; 345/850;

345/852

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#### (57) ABSTRACT

In a method and apparatus for identifying features of multidimensional image data in hypermedia systems a multidimensional image, secondary image map and object index associate a program action with each object defined in an image.

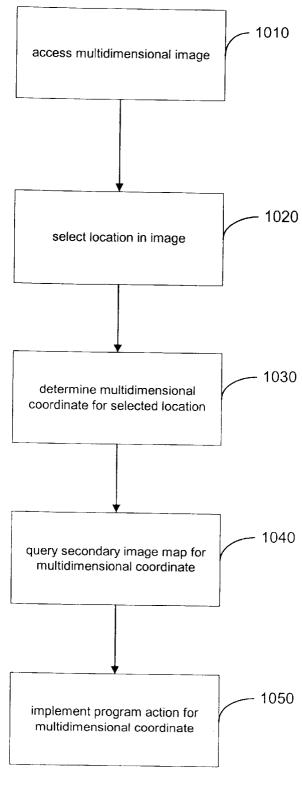
#### 1 Claim, 4 Drawing Sheets

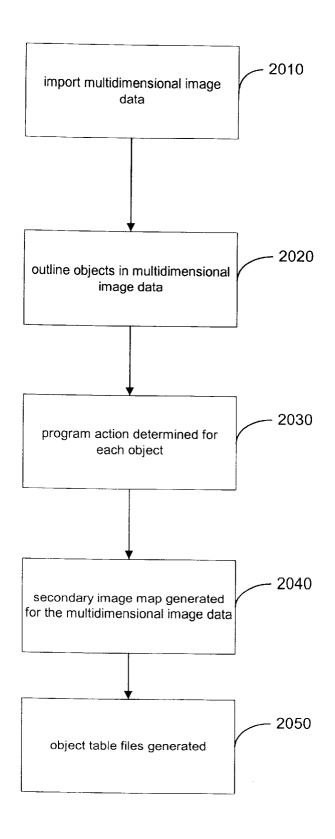
#### U.S. PATENT DOCUMENTS

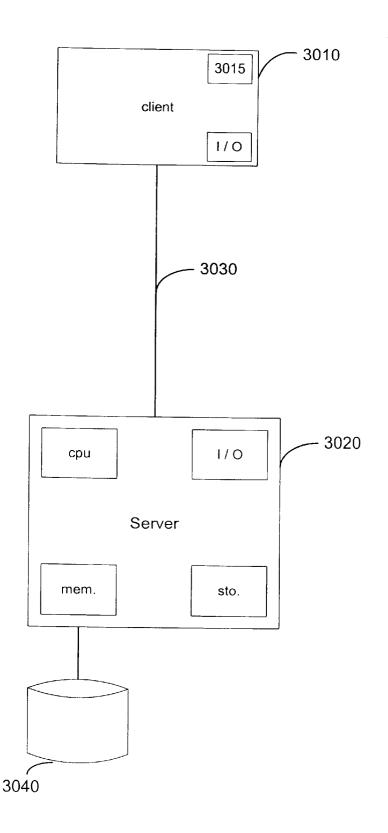
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4010 —	IDENTIFIER	PROGRAM ACTION	4020
	000000000000000000000000000000000000000	Applet 1	
	000000000000000000000000000000000000000	URL1	
	000000000000000000000000000000000000000	TIF1	
	-		
	•	• • •	
	• •	•	
	•	•	
	111111111111111111111111111111111111111	Applet N	

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#### METHOD AND APPARATUS FOR **IDENTIFYING FEATURES OF** MULTIDIMENSIONAL IMAGE DATA IN HYPERMEDIA SYSTEMS

#### CROSS REFERENCE TO RELATED APPLICATION(S)

This is a continuation of U.S. patent application Ser. No. 09/316,496, now abandoned, filed May 21, 1999, which claims priority from a Provisional Application Serial No.  $^{10}\,$ 60/086,620, now abandoned, filed May 23, 1998.

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#### FIELD OF THE INVENTION

The present invention relates to a method and apparatus for identifying features of multidimensional image data in hypermedia systems.

#### BACKGROUND INFORMATION

The World Wide Web ("Web" or "Internet") provides a simple mechanism, called an image map or ISMAP, for linking two-dimensional spatial data (e.g., images) to related symbolic information such as Universal Resource Locators (URLs). Image maps are a simple technology that link simple polygonal regions within images, often referred to as hotspots (e.g., a graphically defined area in an image), to the locations of data objects on the Internet via a hyperlink. Web image maps currently are the standard mechanism used for 35 creating graphically attractive user interfaces to Web pages. For example, an image could be made into an image map by assigning hotspots to each region of interest on the image. Unfortunately, the standard polygon-based ISMAP technology used in most Web image map systems can only work with simple polygon maps, and becomes either intolerably slow or totally unusable for mapping high-resolution images with large numbers of irregularly shaped objects, such as, for example, objects in the medical anatomy image data which Project.

U.S. Pat. No. 4,847,604, which is hereby expressly incorporated by reference, describes a method and apparatus to provide additional information concerning a feature of a displayed image by pointing to the location of the feature. 50 The '604 patent provides for the correlation of particular locations in the image with the additional information for two-dimensional images. A need exists to provide such correlation for multidimensional images.

#### SUMMARY OF THE INVENTION

A multi-dimensional object indexing system allows many discrete objects to be mapped within a single multidimensional dataset. A secondary spatial image of an original image is correlated using a multi-dimensional coordinate value to provide an object index for each object defined in the original multi-dimensional image.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a flowchart for a method of identifying 65 z and time). features of multidimensional image data according to an exemplary embodiment of the present invention.

FIG. 2 illustrates a flowchart for a method of processing multi-dimensional image data according to an exemplary embodiment of the present invention.

FIG. 3 illustrates an exemplary system for identifying features of multi-dimensional image data according to an exemplary embodiment of the present invention.

FIG. 4 illustrates an exemplary database table according to an exemplary embodiment of the present invention.

#### DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 illustrates an exemplary flowchart for a method of identifying features of multidimensional image data according to an exemplary embodiment of the present invention. For example, at 1010 an image is accessed, such as a multi-dimensional image or animated GIF image on a web page. At 1020, a location in the image is indicated, for example by clicking on a part of the image using a mouse or other interface device, the image having been preprocessed to be an image map as described, for example, in the '604 20 Patent or as described below with regard to FIG. 2.

At 1030, a multidimensional coordinate location is determined for the location identified at 1020. For example, the image map may be a two-dimensional representation (e.g., x-y) of a three dimensional image, such as a three dimensional medical anatomy image maintained by the National Library of Medicine's Visible Human Project. The twodimensional representation may reflect a particular third dimension view. For example, a particular slice of the image may be shown to a user thus providing a predetermined third dimension, or z-value, for the representation of the image displayed to the user. Accordingly, selecting a particular location on the representation defines the x and y values for the location and the third dimension is already defined. As a result, the multi-dimensional coordinates of the selected image location can be determined.

In an alternative exemplary embodiment of the present invention, the selection of a image for correlation with additional information may be a multi-step process. For example, an image of an entire anatomical body could be presented to a user and a general area of the image selected, such as the chest, head or abdomen. In response, a detailed view of the related region could be displayed to the user. The user would then select a particular location in the image and comprise the National Library of Medicine's Visible Human 45 receive additional information related to the selected location. As noted above, the images presented to the user will generally be two-dimensional representations viewed on a predetermined or selectable third dimension. In addition, the original image can be manipulated, rotated or sliced for viewing in a preferred orientation. The image location eventually selected by a user, regardless of the orientation and display of the image, will correspond to a particular multi-dimensional coordinate which can be correlated with additional information as described below.

> Alternatively, the image map could be a video clip having x and y values for each frame of the video clip and the third dimension, in this case time, would be determined by the particular frame of the video clip. Thus, multi-dimensional values can be determined for an indicated location. The present invention is not limited, however, to three dimensions as four or more dimensions can be processed according to exemplary embodiments of the present invention. For example, a three dimensional image dataset that changes through time would provide for four dimensions (e.g., x, y,

> At **1040** a secondary map is queried for the determined multi-dimensional value where, for example, a given x,y,z

coordinate in the original image data corresponds to an homologous x,y,z location in the secondary "map" of, for example, 24-bit voxels (e.g., three-dimensional pixels). The 24-bit voxel found at that location in the secondary map then acts as a unique 24-bit object index for the image feature in the original data. At 1050, the system then performs a database table lookup for that 24-bit index in order to find the related descriptive text information or "hot data," which may be in the form of, for example, HTML code, a URL pointer to a remote Web resource, or Tcl-based applet code. 10 Using the 24-bit voxel allows as many as 16 million discrete objects to be mapped within a single three-dimensional dataset. If desired, even more objects could be mapped in the dataset by using 32-bit voxels. Using an exemplary embodiment of the present invention, animated GIFs, AVIs and 15 MPEGs can be processed to provide enhanced functionality to a Web page to extend image capabilities to multidimensional datasets.

FIG. 2 illustrates an exemplary flowchart for a method of processing image data according to an exemplary embodi- 20 ment of the present invention. At 2010, multi-dimensional image data is imported. The image data can be, for example, a GIF file of an image or a JPEG or MPEG file of images. At 2020, objects in the image data (e.g., hotspots) are, for example, interactively outlined. An exemplary method for outlining the objects is described in the '604 Patent although other conventional approaches known in the art may be used. The outlining of hotspots requires the user be presented, for example, a two dimensional representation of a multi-dimensional image as described above. Thus, addi-30 tional dimensions can be predefined for the two-dimensional views presented to a user. At 2030, a program action is determined and associated for each object in the image data. For example, the program action can display explanatory text related to the object in the image or provide a link to a 35 particular Web page. As described above, the program action can be in the form of, for example, HTML code, a URL pointer to a remote Web resource, or Tcl-based applet code.

At 2040, a secondary image map is generated for the image data. The secondary image map provides, for 40 example, a spatial index of the image with equivalent spatial dimensions as the original image. The secondary image map utilizes, for example, unique 24-bit voxels to associate a unique 24-bit identifier with the pixels in an object outlined different unique identifiers defining, for example, subregions in the object having associated program actions. Other object indices could be used instead of the 24-bit voxels, however, such as a list of polygons or some other indice that correlates a coordinate value in the original 50 image with the secondary image map. The 24-bit values are, for example, arbitrarily assigned to groups of pixels or individual pixels in the object.

According to an exemplary embodiment of the present invention, each pixel in the object can be an independently 55 addressable hotspot, including for multi-dimensional images. For example, for each mapped multi-dimensional image on a Web page, the Web server hosting the Web page stores the secondary image map. Each pixel or group of pixels in a hotspot defined for the image corresponds to, for 60 example, a flat area of 24-bit color in the secondary image map, as each object pixel or group of pixels owns a unique 24 bit color in the secondary image map. While the primary (original) image is displayed to the user, the secondary image may is generally not shown to the user, although there 65 may be circumstances in which it is desirable to show the secondary image map. At 2050, object table files are gen-

erated to associate the pixels in each object with the program action identified at 2030. The object table can have the form of, for example, a database lookup table indexed by the 24-bit voxels to find the corresponding program action for each pixel.

Exemplary operation of the method for identifying features in multidimensional image data is as follows and as illustrated in FIG. 3. When a user clicks on a location of a multi-dimensional image in an image map in a Web page via a Web browser, the Web browser sends the, for example, x-y coordinates of that location to the Web server. Web browser 3015 can include, for example, conventional Internet browser software such as NETSCAPE® browser software operating in a conventional desktop personal computer 3010, as illustrated in FIG. 3. Web browser 3015 transmits the x-y coordinates to Web server 3020 via a communications link 3030, such as a LAN, WAN, fiber optic, wireless or other conventional computer network communications link. Web server **3020** includes, for example, a conventional NT or SUN Microsystems server and processes the x-y coordinates to generate a multi-dimensional coordinate value.

As described above, the third dimension may be predetermined as a function of the image presented to the user such as a particular "slice" of an image or a frame of a video clip. Once the multi-dimensional coordinate value is determined, the Web server 3020 launches a, for example, Java-based CGI program to find the corresponding multidimensional coordinate value in the secondary image map to determine the unique 24 bit value corresponding to the pixel clicked on in the image by the user. The CGI program then sends the 24-bit value to a, for example, Tcl-based server which takes the 24-bit value and fetches a record from the database lookup table for the corresponding program action to be taken, or the Web server 3020 itself processes the 24-bit value and uses the value as an index into database **3040** coupled to Web server **3020** to determine the program action to be performed. The program action is relayed back by the Web server **3020** for display to the user at client computer 3010, usually in a frame next to the image map. The program action can include, for example, browser redirection, encapsulated HTML, dynamic HTML and downloading and running full-frame applets in the user's Web page. Other program actions can be performed as well. at 2020. Alternatively, pixels within an object can have 45 FIG. 4 illustrates an exemplary database table associating a program action 4020 with each identifier 4010 in the database table, such as each unique 24-bit value.

> Thus, according to an embodiment of the present invention, individual pixels or voxels in objects of multidimensional image data can be automatically linked to desired program actions in contrast to prior art systems which are limited to indexing of two-dimensional Web images.

> The additional dimension added to the indexing of image maps can vary as a function of the type of image data displayed. Thus, for example, the additional dimension could be the z-coordinate for three-dimensional images or the time dimension for video clips or both for threedimensional image data recorded over time as well as additional dimensions. Like the multi-dimensional image data, the secondary image map according to an exemplary embodiment of the present invention can have n-dimensions. In addition, the individual pixels in an object of a multi-dimensional image can be individually addressable. Moreover, by adding a dimension to a standard image map request protocol in accordance with an exemplary embodiment of the present invention, the display of an

image on a client side of computer network can be independent of the server performing the object identification in the image, thus allowing the capabilities provided by the present invention to be implemented using conventional personal computers or even less powerful devices such as 5 handheld computers or smartphones.

An exemplary implementation of the method according to an embodiment of the present invention is illustrated below and uses a small (30K) Tcl-based client applet which downloads and runs within the users Web browser page. For <sup>10</sup> example, when a user accesses a web page with multidimensional image data to be viewed, an applet such as the applet described below would be automatically downloaded to the client computer. The applet would then, for example, fetch the appropriate image data, secondary image map and 6

object index table and download the data to the client computer. The client computer web browser then interacts with the download applet to view the image data, for example in the manner described above. For example, the Tcl applet converts the image data back to a viewable image. If the image is a video clip, for example, then the video clip would be displayed to the user. The applet program then waits for the user to click on a location in the video clip. When the user clicks a location, the frame number is determined and the x-y location of the click is determined as described previously, thereby enabling a multidimensional coordinate location for the click to be determined to use as an index into the secondary image map, from which the program action can be determined via an object index table.

Tcl/Tk (v. 8.0) Source code for a zMap client-side applet (requires the Tcl Netscape plug-in v. 2.0 from Sun Microsystems, or equivalent): # Eolas Client-side zMap Applet # Copyright (©) 1997, 1998 Eolas Technologies Incorporated. All rights reserved #Distributed only as a part of the Eolas zMap Cs V 1.0 package #For more information on Eolas' zMap products, see http://zmap.eolas.com policy outside package require http \*\*\*\* zMap procedures \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* proc zmap setup {} } global strip which nFrames delayInterval oldurl zmap\_url\_url width map \ crl\_map zmap rgb target set which 0 image create photo strip -data \$strip image create photo clr\_map -data \$map label zwin.l -border 0; pack zwin.1 pack .zwin -anchor w -expand 0 -fill none set nFrames [expr [image width strip] / \$width] for {set i 0} {i < nFrames} {incr i} { image create photo p\$i p\$i copy strip -from [expr \$i \* \$width] 0 (expr (\$i +1) \*\$width] 50 set which 0 3 set up binding for imagemap query as a result of user's mouse click bind zwin.1 cButton-1> { set zmapx\_x [expr (\$which \* \$width) + %x] set zmap\_rgb [clr\_map get \$zmap\_x %y] set rgb\_list [split \$zmap\_rgb] ::browser::displayURL [querytcl [lindex \$rgb list 0]\ [lindex \$rgb\_list 1] [lindex \$rgb list 2]] \$target bind zwin.1 <Button-3> } :browser::displayURL http://www.eolas.com/metamap \$target proc zmap\_playnext {} } global nFrames which delayInterval if {\$delayInterval != 4000) { incr which if {\$which >= \$nFrames} {set which 0} .zwin.1 configure -image p\$which } after \$delayInterval zmap\_playnext proc querytel {R G B} { global header ztable set id [array startsearch ztable] if  $\{[string length \$R] == 2\}$ set R O\$R } elseif {[string length \$R] == 1} set R 00\$R If {[string length \$G] == 2} {

### IPR2013-00292, IPR2013-00293, IPR2013-00294 and IPR2013-00295 Petitioner Microsoft Corporation - Ex. 1095, p. 9

set G O\$G

```
-continued
     } elseif { [string length G] == 1} {
     set G 00$G
if {[string length $B] == 2} {
     set \tilde{\mathbf{B}} = 0 
    } else
if { [string length $B1 == 1} { set B 00$b
set searchfor $R$G$B
     while \{[array anymore ztable \id] != 0\}
         set colors [array nextelement ztable $id]
         if {$colors == $searchfor} {
              set record [array get ztable $colors]
              set record [lindex $record 1]
              set flag [lindex $record 2]
              set script [lindex $record 3]
              switch [string trim $flag] {
    html { return "$header(html)$script" }
                        url {return "$script" }
default { return "$header(html)Incorrect flag in \ database"}
              array donesearch ztable $id
         break
         3
    }
proc assign_strip_url {token} {
global url_data state strip go
    upvar #0 $token state
     set url_data $state(body)
set strip url-data if \{go < 3\}
     incr go
    } else {
     zmap_setup
    zmap playnext
-}
proc assign_map_url {token} {
global url_data state map go
     upvar #0 $token state
         set url_data $state(body)
          set map $url_data
if {$go < 3} {
         incr go
         } else {
         zmap setup
         zmap_playnext
}
proc assign_table_url {token} {
global url_data state table go ztable
    upvar #0 $token state
         set url_data $state(body)
         set table $url data
         array set ztable $table
if {$go < 3} {
         incr go
} else {
         zmap_setup
         zmap_playnext
          Ŋ
# end proc definitions
*****
# begin code main body
global ztable width delayInterval header map clr_map zmap_rgb url_data strip \
state table go target
set width $embed_args(frame_width)
set map_image $embed_args(map_image)
set anim_image $embed_args(anim-image)
set dfile $embed args(dfile)
set target $embed args(target)
set rate $embed-args(rate)
set delayInterval $rate
set header(htm-1) "Content-type: text/html\n\n"
set header(url) "Location:
```

-continued

# Fetch the image, map and object-table					
:http::geturl \$anim_image	-command assign - strip_url				
:http::geturl \$map_image	-command assign_map_url				
::http::geturl \$dfile	-command assign_table_url				
set Name.zwin					
frame \$Name -background LightGray -border 0 -relief flat					
scale zwin.scale -from 1 -to 4000 -orient horizontal -width 8 -sliderlength 8 \					
-tickinterval 0 -length \$width -variable delayInterval -showvalue 0 -borderwidth 0					
1					
-troughcolor black -border 0					
pack.zwin.scale -side bottom					
set go 1					
#######					
end of applet source code					
######################################					

An exemplary object index, image and secondary image map are illustrated below.

Object information table for the above zMap client-side applet demo: (filename: world.mtb) 189129190 {south\_america too {{}} uri south\_america.htm} 251000251 {{}} url atlantic.htm} 255196225 {australia {{}} url australia.htm} 255185220 {}} url asia.htm} 128000128 (indonesia {}} url indonesia.htm} 255128000 {pacific ocean {}} url pacific rim.htm} 230204255 {new\_guinea {}} url newguinea.htm} 255077166 {arctic\_ocean {}} url arctic.htm} 189189255 

 Incomparison of the second state of {indonesian\_islands {{}} uri indonesian\_isles.htm} Animation image strip for the zMap applet demo {Base6 4-encoded aIr image): (filename: world.man)  $\mathbf{\hat{R}}$ O1CODdh3AUyAKUAAAAAAAAAAAAQAAmAAA7gAAhAAAxgAAsgAAigAAtQAASwAAoQAAzAAA9wDV AAAA+gDXAAAA5gAAfAfINAADHAADBAAAA/QC5AACvAAUAACZAACLAAAAwQAFIgAA7AB7AAAA rQAA2ABTAAA1AAAA8gAAiAAA3gAAtgAAkQAAEwAAVWAA1gAA1wD8AAD2AAAAbwDoAADgAAAA yAAA8wAAYQAA4gAAeAAAowBoAAAApgAAPAAAOQAA/AAAUwAA6AAAAAAAACwAAAAA3AUyAAAG kCAcEgsClHIJMrIbDqfRCVOSnOmq9isEKntaq/eBHbIFZu31+WSKy2vvWrlGx6fO8H2Lz5f Vbr5UH5ygIF + hFSchlOJilaGjU5lg5BHS3 + UlZOYRZebnGOeTXuhAFKkUaanjKqPrKmhgpqNingerKmhgpKhKCIcOTkJubkivcKQSBy2uLohvMGydkvBt70JrTkevrMowSLDuSEStSLIcBDCzQm3wb/U4M3j OorfzojQHL8AvSLh4/CU8/XvSb3XuemUgFmjS4 4cpWoEddnr5q2aP3H7Dp5TCE3dIXYPAUps RzFawGUZK2ICWa9XOZLueH2c+EIkL5QdLV6E2bLWSJYQDUimZMD/sM5PK3pbMTTHiZeHFse w4dz4ca11ve7Nolms108zvBLwmME1gFevM26E4CF0ah5rWrnO+AqWK49sMueg3dqVrVqyKgHN Vcs2ANcQgLUR2lv3690EefNQw0V3rV23iO0uWaw1ROG2M/BKXmMr7WW/kBMn69y472HRdngB 5vs4cllAtEQAtuzYcGizdmzNvlEbs2bYnQHzNu22KqFonnuDdo0aKC7hyu8aB4TS7fDWgJuf UV0a+3Q+hK0H3nwmPPHM350Zb/2bD+XutpmTx8qYtWHeZAXrrf/59Hwx68WXH25y0Q0fb+L8 FOaAXtOglocDGWhfg2IFRuB2En7m4Gw2/uk124EBbJjdhWtWN2GIDyYInmw3hOhCDTBGICOM NbgAVjYkeqGagwG8GOOMMNrIG46picBDiz3SKGMENAopVocYbuWVjzUs2eSN2sHBi5RJ/sbk krgqiMwwjlrpJzghpmfGYlyaCWSNDaopBptlKvmmjX7xAOUZtOTASQl2fgmnX3AlSGeZHnh5 JaF7rrnjlIEu+msoX0QTgox3uckonpomlsolmEbqgQctbpglG9rshemoVd6JqzwAarmWg6ye WeOrp3axJZ13jOqBrU7CuucndY4KbJy5aqHarLOmCmypwrKx65S+/spkonjoEK2usqll46+/ fpvttlkIZBmJc/j+y0qi2yWKx2Lldtqruu032QSa6rUbAarZ6Uqpst/HKWCSmekXZZ3pJjAq jwX7m8WyI-C7pK6Y38ABNkZdGLPDCr15cILyaKuzBuB5jmHHAQI4MlsU0j8mix1+SiiKRJbLY bAQEEEACCQf0vDMBrrgoJ5iPrHjzTnv3PMBPxNw7YYJh2Eprb7qzLPP0T89JNF0350Roo jbXWCpvadR0PuvBr0lcznbXTZXO95tRJ4qyzBks3vTW5U6RdpQdW4+022ULSHAabDr5ot9J4 6x03y3MWjfbPYf99taQz6nbWopTPrbTHBs0hy1Sdm513iRoAHTcxbT8RKphmS62/tsaflCyW wcMe2WuVng9ue+vlSV5t4J9PLLcZurWo9qiWH9B46nCTenysqr7lftNiV/wyu9HxD8aizHmgg /tJhE 262 oy 93 Lv74 g8 Mt9 PRa 2 qy 2 vg Ss/zzhad Ybyd RIh 22/49 zTnyi 0 Nj/A 2 U98 l7 sV/FA 1000 Nj/A 2 U98 l7 sV/FAv78F7oDuy9/ZjkC62PGufgcUX7hspC3cSctIyrtg6jK4rzxF7YMZkx3P7AcOX4Uoc7EclQqz pzrQkapgEzQCAUXYtp2pjknvg+GCbOas3ultVIQ6IbdAVcTT+Ux8qxOSEHVERB6ijmw3nKKy Mg856lgBQIIYxi/eALnTSwzORwCEa9agi+KcYwrKCMJ/sBlKgBxMXzic+MbyWjGOKVRCGvE owYyAEYBZACOZaydH+1INQwOspBi5OMcF7mgO+JtkBk4ZCTjyDS4DSOHANKdwnTmxUzukZOK rIE3D/epFo3qbmOEYyYP+cXlubBgrJSSr3h2AkKGcZaZPIEGF4ZLOEiod7zU4y8zaUuOWsyX aOHmAWJpSDEyc5jSe6YxpSRNau4xA83MJijD4KcWdVOZcAxnHRekql1OE52GXIE6nyQGYgVA ZOLz5iYTabxihHltalufLO8px37+UR7nEtkKZOlQphmUkb3CGd56yVBEQpGSOrKkBmIJTAHw

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/YFwulss5KYatjEwb3Qju3yqxDe89Wlufvd725PF7QnmqMoZJCDfzdr3wRHO6YUToOEPH3jE Cz5xbfMZ4H7JOBivVkMrHvi4UYzxstlmV5hUN4dt3dZQ16uBDhIYaT2bMfZfc2L09xdCyjm 3TIJ2nV7u9/2VuTP+xDOe+rsBNOF7c6TzjGR/1eh6TV4etRxcPJOf5vq3GO5OEkA9Qw89gMf OLrXeS5ugY/851rPNNq7rXaKo3hI5A4LUy169rTTVe71vbvbqwAqnEM9vRfw+9+PDnYHWZOK TLybIR+b7sWj3bGcDwHL9Xl4nXf972j/7CHvrXmgExylXL9Atysf+kNE9N1MB2j4KDrZuate 7ZdnrQAsDtjBLwLrxT737YefeBnvPmu9L33st/vykqN79eOGt+55v6GrkAH4+/48t739gcAf 3+faqvnYOX7w3Csc+UtHBNbjLVX+d98Gh+R9+qnQdAMeXuoxdz36HZ7ve5Q4GiHchWnSLzx eNZ2es6neu4ncxfn/ngQJ2btV3cex2mkN3DbhW3bZgEaqEpOIEbiHCiBXsH2CsYqGObqIEU YAEdaAIWoGOfAH8GJoJQwEQ1eAEnaAEpqIEmYAJHX1px5DQy+AQ0aG4ZeII5UIHq9oIK8IMR QChvR4JEaIJGeIMu6IMn4DTzJ4SOUoM3eIQauG1WiIX8R3hbGIU2OIUnCIZLeIVNOIaQV4aO VYQb6IUt6HFL+ENZKApDGIdSOIdU6HGExIZ5yAQoEHQ3EAF55FlyiIJ/CG7BJIYGKAr113OL iION2G61M4hHOHQ4OOYCxm1deIkh6HuRwIkE4Ik2MHccuIppCIgxSIpOYIqoOHc7yIFO/giC r6h8gQAqnbgCAkaLJtCBKXYCLrqhBafKEs+eLJpd2LCiMHoiExVg7QegEvMhYv6h605gCKuiM 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OjGOwGOGbgp4O2sr5VtoHKbcHCY8fZONarx8ydNGgJsWL15OJBvHT5kQgCbYVYOXLRjCegu/ 
$$\label{eq:anihorder} \begin{split} ANIHUYOQQwEHWsP262BCeww11SGnT6KhlxV5XcNIT2GX/o5iNpOZV6jIm2kWTxrMqJljGJ6x\\ OMAAemiUhppFp+S4gXP1T1ixZoESSsqmoyouPCDVqXQrJ2e2cEV1RNVOCCsaVmD4gEDnH1gQ \end{split}$$
 $\label{eq:model} MGuOEOBwHRGileOJjW2OvheSAQtWzTozidexp8z+XOx2PnIvmD0fTfD01NOCuYXtWjBzfsubbmVWm9bu180qyecytazv7cu7M1YUDH3y4WB4BltRGOHgB7hLq10ccsmCC1cKLT7YQ6KNLj/smy2853daDSKQiVrsAvvGm4CAX/hL0syAvIfZzsL+QDGGMQuqIk4KD+epbQYEPOHQMB00e9G9E$  $\label{eq:spinor} JDLTgMALVdSwmA5ze5A9EYsgUQkcLURxRxbvsqAAOWQMOS1QIFzEMEdSpE/DFvFi6UcgOyBESiSK5MzKJLU867EygITwAR2GFJPKzuq4MoIs7OJzrx5mTMM9CQkb8wY5i8tQyS13gkyy5miU$ LokVmAjUOvvwRJS3wEJyc4IpHxUUrdpAw2e/OnjrzTsViCiARAWoPDGKK6+zrUnczIFgt9N8 A9CC6cTjtFUVa2MsPd36qpXU6NSxOdHXeAWAzizRc1LN7fxC7TvpbMMtgMOjnNPPOYJ1bDw1j BYRP/1sdsSwUzS6bG5bN96hbt11OWQoERO6aEsnaC11111tD1UJ0T6eeyVTXHJE898x5KfVL USFRRVa8feNN+NAyTPsLAhrfHCVi+ayw0980Ra30nDDdOjIuh09U20JRqR1YUzJ1s6IsBTAw IIUNKo6sgw4G+LnnyUq1ZYMUDMCB1BvgioQYA/jYiTSefQa6A6GjK/poBXapoaBHmF6MAidh a LWHnn8e IO jer jYaBSOJqc EsKb4 uJmxZQZwa7 arVrbbrtreO2w6af6 lbteOaODXVq/11fl2224 arVrbbrtreO2w6af6 lbteOaODXVq/11fl224 arVrbbrtPAAF6 arVrbbrtPAAF6 arVrbbrtPAAF6 arVrbbrtPAAF6 arVrbbrtPAAF6 arVrbbrtPAAF6 arVrbbrtPAAF6 arVrbbrtPAAF6 arVrbbrtPAAF6 arVrbbrtPAA
$$\label{eq:linear} \begin{split} & lxycbLENP/zwDnZjZu2s/37sCptZkbw5yg/fDgZcnum7ccCpuKGGYVZJ/oHwOSannHSBiWZ8\\ & 851bPyHyhh7Yb/bRG44Q9dy1gITmExTAwemwfQd+WNEbqD1CC1K4wO+3AQemc+Yt2CCTMYR9\\ & oYEBaB+eDaGO9sBxo3a3GWed/xiNVubKN78By4OsHk4m2j8eFe/zXt3CwB+fUU5/GYsSEb4i \end{split}$$
B6W5DyHLi98XCnc5yp1Pf8xYoAQayIh4PCKAEWReznamJ/KJzjmWEoKbO1gKAM5AgBP818h6 JroM1u47HLzemFwoBat4QIQyTJPUzpZBDfLPLT3OGuRuRsIZEpFqz/HEf6yXxAcCkImfe2Jf zBbF3kTpdppzR9e49yo+SMB3pKIVfxO3NIPp/tAAGFifEoHRusG5QnzbwVvaArM2K36wjiL8 HDJ1ND7p6a2Pi8uaAwEZQuWNEHz2mxz+mpPIO+Fujl2EYRCdqAL2L06BVWVsArM2K36wjiL8  $\label{eq:started} \begin{array}{l} qN8Jz8cc1xwAcXTHflUC+UghqpKLOqtdOlggy/9FoZYSTCUZoGg+6qUPCaXcniOFqbMt1m2P \\ euMHEosOyzowE5I1hGYREVkZai7i14F7XxOdOUQuR1Nxz2gh4IwjiTxsYQMTmCEXzzYCcxax \\ quadratic started and the star$ LOOLwQYooohHnaidg4vBPMtWz3sCLZ+p2Wc/BXCACJSLCp6imzw9RIO+3G8A9hwBPnugT36y w6FHwtBxvCHJFOzt/nAHRVtCv7NQkBosoGDDRAVFp9H76c2jDA3piTAUADNewqTSu+BKO6rQ jwpkp4MiqTGCK1QUFrW1R20oTBNzgMXEs61OFR6fajEBqSZVbnKpTz2Y6sn1aPV8IvKqTqk6 14OANR8WZaVW9zeEUFwAqQZzVW1MsIGBx1VP5UNrXYMipqmKVEUHeGdfB1pAGNATfyPQ5TTt 2kHEOkexCrnEvx57wp/ZE3HGpGxhC8PTxG7Er218bNkEm9KzTe+Ile2fzHqFWdQ2NhD2ul8D JIvA3 byyqx2 EKJOyCO/ckoGeNTUf21y5 QKgAilMpukEE istYguINtIgTpRpM9 dw4 XchA/tcxBit21y5 QKgAilMpukEE istYguI5S9Ny8vRBYmuqfVAlNpWtMA49So/fzuwaiL2p1+8oLSE3CGXzpcCY/XsboVsWB/S+K8BiDC ttVlatNOUbTC1qv2/apeT2zdGv+XrqO972ET3OEZH9e/2M3uVpO7kxcXuboODgRkMzpfwnoX rHbosZSR+98qXzihlvGukQAqViwcOb5fdrBCLUsc5HXuAxe4xAJqPLURyADPeZaBeatWqnw5 sChfu8AF7kHnGFnUznroOM5+hqoJ8VcMXblbMoOF6aNZmVNF4/maOn9UBHKL4EHKU/jBp/nvn semaoar / Amori Teznova - Faquor Convolution of the analysis o OyDYgPf2ygW/AFhOgnGK+bvUEbf36Ljd5IoDGpgpOfmUT2jqWs86rWAKyss96MOjzJzjnwV2 rfeMwdEagedOKLnMNV7nz+oZ2BvN/l9H/eFoNyQ9OscWhgaAjuinZ7q3fVZltJO2dGRb+9Ub 9zqmwQ4OfvAyQIRZwhjNThaOKzvobEclQv2M9JEzMuZHWXi5Qax3Pd/a6tf7e89B+PO7KPvc DYD44fk+9nEBvvHbSBi2g130lXI635kMvOabnkdWBnzboHd3L+hg8tJz/OErx7HlV3+RzEfw 9Ws3tewJ+219M73fU0401AWO4ybXvu64D37e79x24x084r93/PJ1n2nPix36I9/FOwJ9FeXr xOmGX3T1cX31xV+cNiuY8ReE/3QGvB/+DLg+VInWTOdxTVAJWKr8xFH9+MN//ryj/hJBM2og ABIAmN7r/owkQHwKirdk4P/eLwA9YQBtoAAPEJjO76dcgRwO6M4YoAX+bwJBoAIvEAGjILzu ABJAIN/I)/WWSARIWABPEADkogZUcNkkb9bebwf3rHzEjgRjyf5kEANROKcQZJByMODkT/KY SwCFkACJkAYzJHJW8N90EPUqlb9seEAotUAqlQAEJJ/CDue2jguPygTBkKT6ioLGkAzvjYGG cAYTcP/YjwxUADAKz8PkYSEzS8BESIABusHeEL/ZCEATLcA85aLaKEAUAsQYORLM4BLESLeB8 MBEt6wQbMjRAhEZ7sUK6EjgcPERH3hw8LIXMdkRPZUAcl80F6EAbHUBFPRk40/vER1a8TV5H5 VO7/WiDVkMkUpQAVbVEV2w/T4q8Hb80WhOl+YCwBNzED1g8X/S8CZQBxRokEYxFQTvFj1G8P nIkYP3AaN80pSrFI8C8DAxEHSS3RIpAJyY8cqeQUN5EbF7DwwFEEkTGWZktbaDEVxfAKd/Ae ya8CN4wfhGZ1DDb2vHzznAIZaYgoTG3Tu8NBbILL3AWgxEi8w4L080MgxANv/AP5TEjpZEj ny8G5zAka3IkUy4CR3Ga4jAKUfIhb/EbITAcRUsN+HC9QHImhzEx2TEAxzEWvVAm9U8lafIn b3IhPbJ/ULKdFGuEvCAMRPVnbJIBHAArsRIAf6Y3/sqPbaZKWObqVcAPBKhyAKwyK7VSArky MLzyaIgsLpZqpsqSL8oHLdNyKwegKxPvLcFKusxo1HajKg8xLROgL/cSGvqSQGbjCBcjME/I EEEQKwFS/tiSBtwSB+AyoqzAqorhMesN2CbzEGXAMjFTMwMqD/bgMzctUSyzARBTHRRzPJ7s MWVFt8jQ3vSyLfkyM8EqpjzTNiETNyWOPR6ANO9TARckH25zOMuwOO3qK/OyOQmpNISzObdK zAzLL+cDMKmTL36mOZ2zHLIzKgiEuATAewKzB64SECeTI59zSE4mNs4zKulMHG4T/gpTFLHT zAzLL+cDMKm1L36m0ZzHLlzKgiEuAIAewKzB64SECe1159zSE4m%s4zKulMH641/gp1FLHT rvRxPk+rPqfyO1kTL18Q/ifJcOyYkV9sKODpcj3PkgcdINgOMzDwbRQOAMGObLqgEmekOkEH 8/OKM9jYsuriMOHnOOA6rEHN8i6zOgWxs7v8s1c4EzO71NBYND/xciOHAD4zRRZra7/04B6B 80FbVC0rUzcvsz8hDEihUjWD83CMIDB3FDb1UU7os0OhdCP1k0p3Mz6RJr8WVEVt1KyYM9um FE1hMzp1BkvJU1RAkwxJM01NM6SuFEDJ9EPPMjxHx0tjszfN807d9DshNETfEMeM80s1s009 FEdDTEDFM0puwQJk8z8ZFE8b9Sp11DV7NDoXM1AZdVC11EFV1EqV9VNvNFRz1EW79DITD3vY /ms2HY8LBqr9RsBRdwBXcVUtNwoI7WsdDq5VP0UCZjUaC8pWMzVXdXVKeZX+YuBXLSIu7G7h KOW0fcZysTIZd2BX19JXKQJYmWUGPq0kZKd84tUBsnVbe9VZrVRvaVvax5UcHg5bkzVdm/VZ ayJYrUB54HUfYo8E/jVXWWBZuXVdpQ1fN3PcXASu4rXe/tTh/3Vg1fVerSEuy2Jah5RcG/Zh /1XiJJZdDzamSqqQJLIFNpZjR5FPutVgKRZHRY3CGBYLTZYFJG56cjJAPpZlxdJ1F7ZfNXZj afY1oSID2pUDgmHSpYGTiqjD1FmgdZm32Ducvbn+JV8MioEsfVfn/1F2HIWWCaSW9LhAnkZW 1pCXp12a6E2TIv2a1OAVmEvZ1mAXpd1dEpHts5vBoJ1bdvW6461ZE12SisnaClAFNzmBu6W CmSVbYvVWm8VVx2WZ1tuCGIAbTOgZONgGzLAHvTWWBk3V92Tdp7WRh7FcItWXluEWGuVc5XI /aQucJHA4q4OI6yNWH9nb1NXWy02qÕp2w9QW9162X5eWbDsXdwVQc103bRE3BqyQZM81bleX YNdh5F3FWEW2B5WdRmAWYn3WdlUelmxek3WELOXAgsW3GA3bxUXePs2awXOY1d2dLs36Mw1 TRdn5F5FWEW2D3WdRinAWTH5WdUcHinAk5WELXAAgsW5GACktevataater tainter THE TE+2+DSIBMmXaOG3doNXWbX2fif2fc8X/nX593ad92V191e7NoBx73Tj13brlTtl6lt5N+Ma eH/nVXid12MpJL8gYZOUZBip8gPntQIKWHWLrisHMDOOB45sgABA2BtFGJJ2lQLGIXbUoVX gIU9WBDphkiLkYYr4lQ3KoWhcIXhpoU1gUU+ZznJZ4SZt4SF2laJGleNWIeRGABCKHKauN6g uIa18oYvM4dZOItdeInPit/f91+/2DDD2CO99Y0N9w74Cn2S+Hv9to2PWivmIzn+Kg09I7B F+fmdIyx21992NzMVGbpd6veuDV2+JC16D5fwHwCeX35UW1+66jvdt820f5hbZnFiJFJFY12 ufF6mlkn2WcF/1ng4PMr3IGTQ+iMw+aT1ZeVMXkmytFwZd1OdaaW4dZK8BxZO2yXLkP3+YG TvmFe5n931SNHXYHGBnHHFmX1RmGm/k7RziUiXM8hOAZkdlrUmGZaVKGyVaYH5abF6jAogKJ

#### -continued

O3mcQzibZ9iLpVhCR9mb+5AJYjkV6IKZV7Gcg3iID/We3UKfW4cSbvEB/nmehlg3FOi4rLlF zsif6/KJcTWKG bqIHzqQYDg4zUf1FnqKCRkKAQWiyZ1WVpkF6DmPRVqTddgJShqe1/OZN3a1ingCRkKAQWiyZ1WVpkF6DmPRVqTddgJShqe1/OZN3A1ingCRkKAQWiyZ1WVpkF6DmPRVqTddgJShqe1/OZN3A1ingCRkKAQWiyZ1WVpkF6DmPRVqTddgJShqe1/OZN3A1ingCRkKAQWiyZ1WVpkF6DmPRVqTddgJShqe1/OZN3A1ingCRkKAQWiyZ1WVpkF6DmPRVqTddgJShqe1/OZN3A1ingCRkKAQWiyZ1WVpkF6DmPRVqTddgJShqe1/OZN3A1ingCRkKAQWiyZ1WVpkF6DmPRVqTddgJShqe1/OZN3A1ingCRkKAQWiyZ1WVpkF6DmPRVqTddgJShqe1/OZN3A1ingCRkKAQWiyZ1WVpkF6DmPRVqTddgZNqZkWiyZ1WVpkF6DmPRVqTddgZNqANingCRkKAQWiyZ1WVpkF6DmPRVqTddgZNqZkWiyZ1WVpkF6DmPRVqTddgZNqZkWiyZ1WVpkF6DmPRVqZqZkWiyZNWAQNANAIingCRkKAQWiyZNWAQNANAIingCRkKKAQWiyZNWAQNANAIingCRkKKAQWiyZNWAQNANAIingCRkKKAQWiyZNWAQNANAIingCRkKKAQWiyZNWAQNAANAIingCRkKKAQWiyZNWAQNAANAIingCRkKKAQWiyZNWAQNAANAIingCRkKKAQWiyZNWAQNAIingCRkKKAQWiyZNWAQNAANAIingCRkKKAQWiyZNWAQNAANAIingCRkKKAQWiyZNWAQNAIingCRkKKAQWiyZNWAQNAANAIingCRkKKAQWiyi7ild5iXTXo9K7ppmfAlq/im2zmnYxqIvRidB7k32oSPhfqD+/1DK3oHLrqAW5kZ/hzZ1LO4 qXW6qC2ajdvBTJGJIK6oN85huPZnLVajd1knW9EqFmHrLF5p+WZq1W6HW3aW6kknG9Q/cgO  $\label{eq:generalized_formula} GGyyXKMYsLV1LcWOL4nyGjoZEvna6/w6qgHbhKeUNAk7MQO7B+roVzBBBfO6RBvbsQW7MiU7 NikbsedxppaDUP/asYUYsheysAvQJgKIBGoTxEKTswN7tUHbaCgbq1XySWcb1B/Wtge7qFpb Bm3ikLPUt23Zb4W7Moi7feZ4QzAbeMjHklmZtSfbtbEhkjGWlKj7t7cZ5ObJuQB7kkNDBUy7$ ui+ZFEM79/sspW340Iz1EVZ20gxUwxAEYq7slGh032b/gE29pyHub6Dtg91UGnqiEd6+6zu OMAB1r738L796R2gALb3uguU17uV270tp71xpVH0e7cTG/yQK8PnW5Sp0b5zewngRgQQ3dK1 UrP/e76drbmWFAMK8MADiC5sQLELirGj+JZTnGMcx8WbCMYXe7Md06UZ2b7hZDMOW8frwmmO 3MeTPLU9e8BtVh/3G4Zi28jpTB1Pu7Yv+rYh1OSppMUrnMfNG/Z+/MrLvLnP/FHSvMtfHL7F PLVVm7lLgC8Bhc5VssczHLWFmcz3nLjnwMV5fMSR3JY7GB75HLuL+89FnMp9hrFllrOpEbfX u73VvMct3coBe5gje7gjncg9/n3Rq/wqx/yxQ3DAO5y99TvRPx3P33ywj6gNrkeOUb3Sa93R DROaCHrSX5zOYnzQg/uzSz3WidzAHrFGuwAMNHueA1uwSb25dcBPBUAKNdEDSODZCyDakXza pbqNWRvbv3LbUZESOjTcq3zcvzjZrz3bO511vBOHFHwfQP3d6Tne+fzc3/ILHbE2LjxjgW2u qb3cCfvfM/MLm93enaaOezaQO7vazX3e59BTolJ5Udp6Kl7hLx4DaSMl2TxpOT5rrd3fQR4B 34u7J1FPNfySpOfeOXOGUWA6z7tnVc7EiTMNakH1bV4u4Ttmo3qReX4cUeVosKXmAbG/GXbW OAGpdguhEoEaSYAzpAo5VYnW6wxkDMduV/mCK1OHQzbO9Gg11a6QumAEGk8AmbgxnVAplYrV cnmFfY2VnaWttaUYDBUFJAAoRRzopcRMVfUMjAAKDhKSyYwMILLFLA4dRDwmBXhQ4lxYYlpt dmCTYSO1uqcMgqoskpqZGAXtZpcm55fuqW8qZogavJiTdTDpdWEzQLt/iUu2STvtWC2NL HmQ8WUo8wMC8NDSOtHCNkOebJ/6mugYgRIBtsbzFq1LvHj4WD1k8K9cLoLVHA7XBQqZDHj17 +Fo8DAmRBTRR/qgBU3fRqwYBGLp96/NiAEOQ/iJFtug3MdO1FCFusDQmaOK8eTOZ2bz58GOD k+hS9rwT9CVCFUY95hOk1AXTBi9g/LMA1dXPqTCLdqz5cNBSfPZ6zHsgYUI1DVFdFaNK1OPC jzuUgmLQwt5XGKYswMmg6sa6gpTOou3bcO3Nj9JKyKULbI5FdpViMaa9GYFrm69gqUGpyIk ggY1Ukn7cWvbFiNQw5BLOW4dnxg/g7M1mXbXwirmIg44zDFwZbaafd1aPC5yA3HUtXrVPNNz gg 110kn/cwvbrinQw5BLOW4dnxgg/M1mxbAwirmig442DrwZoadatlaPC5YA3HUXrVFNNz fZ9qE6Y+ATGGDJwbT3IHmzsz77h0nS6cmbx5D4xbGYSJCUY46ONKjiIfconNcZ9n7xAVmyYN iPOeROeMR6B9djD3/k4yRnXnzCAAovVLeQVS+NoszjHkXkQ6nUPRYuh1NCJ7gIROokk7jcXi drWOplVpawHoV7o8L5diMi/óx1Zp+JjOwo814tfikDg2KONK660hgYp02GhhcDnuwyEi8yV2 wIRN3tifiRs++A9PR5CppXNc/pcmSspBcuB6UBYpZYdAZnmnmRqG4eWSdOKX10YPEH1moHI+ ReiBF1AQU6KA5sKoine1Z2FRL/zZpaV8D1ShAZHSIhlInqKoZoOr0bkRPfVwMtxalaY6J2sr tXSMi1aIBtGOMQqqKqF15TXUpv2N51BODiF5ma3YEStUpAm9J117NoEzmFcvqEa9mY/jWt pNU2MMssOZ3pFvm5DYXBZvdFe5er4r2F2A1EcatauVh59114KrVow4t7CjGrrVJZCdKexL r8Br7WDcjfun5EcrWvWtm2mDDVBtbcOCa6UvCm4ac6vE/PW4mxM2K60DF06bV12cdKexL rsBb7VDcj6up5FqrMvVKm2mDDVBtboOGg6VvQm4pg6xKFffVAzpM8K6jQFO86bKVxaeyuxTH GzOeioaUcrstSxjkY7DBsDO1oNT8MwUSGigqBU/2UG6UaOpkM9AfjrkwaON2GmetLC+NNZta T/HgJvjo4vvVBgtbX29kk4i2hmoH+yymOv+JbqUFNOWjo6Lu2jUYPDpQLMg9ws41Bnus3GA g34Lt8xei7KtOpvZ12fgjFN++JVjK15ynmt7DmSIeHPu4NeX/gpdZup6+v2txa7DqTrbdreu 6+K1ww554v1V1YnUoy+6Op9NqjcLX6+Tvueqd1rwpLVq9y7srWW1yhGyAxd/O+ICReum8DV5 IhI/MvTteO/RQobozuYP7rjzL5uFEKKy5SkSvrjhvo42xdrvKuaS1XCs44/5MM88QLgvGSD Dy/caxeo6dbfttG+qzxMWb8yDdSQ9jzANdBUGoOPtmhOnQgwJlQki4OINcYUUsyjf77Rjvig  $d\dot{D}KaaUtAdPFWv4DSkhp2TTrxEQ99fpcrPzFVZtP5GX3OQybdiU5RtMohEZmmuQRzna8qKLYTtecoiOjJ6fqnFMi1MU23akvRaLe/v1Kh7m3he5NfinNd1jwKSZIzmjo81Xdvtc6IDKPR82a$ Itecol0JotqnFMIIMU23akvRaLe/vIRn/mone3rmmvu1jwRs2z2mjoorAvtworl2RrRoZa X+TimMVnSMwwjVLM3Wg3te45qzo4qA/oVnjI5sVOTJVEHe8wqb46RMKQRkOV91iHjZ/U4Id7 AMcfmkGpQpgBDedwAzAccco1NCEWUWBF1z5npIcYpbVsGUrUlkJPmSi1YH4ZSiCmQhaNqIG y8mDLrHoh14u8xnA10UzhynNxjheVLgizJJwkxDcJMNOCTCNONJTQYAJ1+IF/5CrHNXqzT livJ5Sr1cUOtjGZD9xRmLdvJv1UqowM16sLMHALLBqRTEQU1iw+FEk9ewkhv02JKOiWQz29m h4GhwSZD/hsKS5oYpw1iiQMx1ZBKi4awKSazyXs46Ew2aCaaOzQpX3plrmd1EfdrCWW3NmECzowWSNSSDM7mk86hMColYhpBpVSuMFEFJoZOCoq+blLFmaMOKeBy1B1ekqgeFWeV8jCDQlG xXYVIDnsHEZF36FWZTJUiG8FU3laikuhfDWZJAUUePg3IKxNM6OY9aU2rxoeJ1qxmGmVQEIH e85YwgWyZ3SpYq1CD7y+cqDPpE8RQPfOwM4zJ9kUaFPxGUO4nvauvUxKY9Hp2omCs7OC7QQE gSVadb42t8dc7GrjxxXB3FSiZpXscCvL28ueIaVxDZpw7UrckrLWtrNcKSWj/srZ5u6WsdnF LEGjaVrd/108gfqtcudKodheN7StLe9cIZEDPJBgBTbYwwKcywDi8UO7a1gALW2wgiLMAAAA yMEMwmkDWRSgv+EFMDQErAICL8LACFYwg1OpX/7618JksDCGDaDhGiR4wQ3074MZJuHOivi/ B1K+aY1PnGIp1wXEyb2ht08VkhE3ucs2/nJFIRNB2gwUBuDaCn0PQG129eMDYzRJcscw6 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glyinBg3ulhICmYoPwBnRzaIPN5YT604e2p3vg50Qf+3twVngZ1gR1UX+7JnxYunxSyIRU6 YuXwICQGoR90oiJOYQISXwPOAASMIROWxyGmYCcaof7hYeaZnSni/twA/iElfiEhEJ8eFiIA Stability and the stability of the stabi$  $\label{eq:construct} $$ u_s = 0.5 \ w_s = 0.5 \ w_s$ 

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COJDQh4mWOokASwmAERZOzYmPPRUW1IWbPYgiShr1ZbKkCPxEZxJkZLZVV+DGylimVW6mD/mkPJ61ZJGa70L4LEMomOSLIRGrlWRqkW4mmDJfhYJJS/5JUJTI1hVkPY6BaxonYiSmBwBm1wrk YAondIbjKLwmOlAniACAcmJnTF7CZ9Ikd66JQLFWx7BeLqkajonDfiYCE4GRpokW+5jWEYV eaqnbTalasGZ/kjk51fup2165H8+5x0O5Zy9BWnGZnLG51IGZ1PWJHzo5WNIRl8iKHwGZkhW aFDipWHSgNJQ5wnYR4JS6Hxu54h2J1sep3j654oCqlh25YsaaNp113i6WnkypY0eJI5oEoq Zn+yo4+GKFoG6XoOaUd6qDXS6ILeKJNCKJFKKA8AzpF5Yj95I+aNmCHgIggE2ljwAHxiqXbo ipYGH5fqn5f+F5gKo5iWmHKUaUtiqQVBWH9t6be1GT3CaeKNKZ2aKXO8xI7dX9fNBJt6qZ+a QZgGakXUKQfcaYtEWBquKUD16Zc2apw+qjBE6qQek560XqLyKeahzZtuKqDOKaQO/qqIqcCnd KeqislsLDICjrqqn8uhPuKqeBh+DvOmiaipNcOqtrKKKYg9gvaomsKkg+imt4UIDPCpvfOoQ 2o88wGqLmpO/CkMyO14QMUNfKpjwBQIqIGXMmqtDqtm8AsdhOtrV6SFfgTanKutahVv9KcI eKrdddeBrangTmaek12aEmuzZintyOccAcfu8EcachDruziNBacLLePMIa2ParGDDDu2Da1Kx gKpd9dcBxmu/Tmaqk12nFmuuZimvQoCp+Gu8EoaqrhOuziYNgRgLLsRMJazPxGDDDuzDq1Kv 7Wm8X1W/imEPequgtiT75KkK70mvVmzIZkbAMVIAhGuexUPKmuuIxUfikRtntOtjnMX90Y0y YqubbpkecmugMY2R5it/+WwLfqqsDu2wNixc2mnBomzz/tWEksOr1JpOq1KqwQLtrPrrnwYs OGY twwouOlLt3AKr39IrKuxo3nat4caq0q5nGLse5bsxSu4zpt5gps2U4txHLspapt4o4txpKuZBlDIgrWc7wpqo5CUa7eiVkEN2Bx8HuNcnu7PaD7e4d7kKC7i5BDb6EY8pd7DID8Aav $\label{eq:wuzokxewlfQvhu8wKvSQhv2hHveFKvDUieBEiAbdbD784u90Lv8Epv8YV7JrNc2gr} Qt6ujeWuZOkXEWJfQvhu8wKvSQhv2hHveFKvDUieBEiAbdbD784u90Lv8Epv8YYv7JrNc2gr$ 7dbq+npv+46nUelX787kAAGv/uHU72FGrz6NZ1ft7woy77eJUU6YhFcIMPs8ZAzlBf9iAfq+ KcfQWynKxf9RF/gqgfh71pZizVLhqAxcq04QeY3PRyFhSSL1+cr/ampwkL8A9+wPcaL+9y YayJZrzOcACTZvRyRn/gr/iuoFEsxNX2KwOHMQS3UwHvGgX38MoSxgPfLwHjygFPXgJTsbWt zAA/sQRngBFvcfaKOQXn5riRb1/isBgnbxmLsAxrq/IKCBk6YAR/MABdb4208PNu5BqTxwOy MC6tAFVcLwzXqgZTb/dakQcTMhkvAQ873/wusy3e8M/15/sisBUkccL6cRNfsTRIMmdp8fJm 18WC/qw9WHblszlks2gFK7IOygcksvIjzU3Ai8+kPezEgq3AADjLvbnlc53llfwkgN3IOs9gt 97H6lvDiOjIwwzEsDzMJAzFO0vLk+oQtB7M0O+8nWzMYc24k+FApvzIudzMzg/Il4/HxkjMf KzI1d686P7GKvSRdIgDHJrAM6PM+MzFOBhobChGWKjSeegSQCRIqe5vM+63M/a24KAHSH5i+D 9eQFGLSWJrRCM/Q/B3T+OnNEXoCx+Cx/SLNCL3Q1N/RDy+ZAf+g9FwBliV78cgJJo7M/YxhK y7BBSAnSz61B7zjB+gOy140P9MEycXgDqmkdQqOioF1MXz0QZP1KctOP1/SOoRlH+IOAcA1 pCQIOeFyXZuOOa61V3dOQPo1BQaMT2P0YAe1Ux+21el0SDuMEuMDULuBTRu21EW1RXPyFKey A 6 NkU 6 eO9 YX1 WL uz Ur Mtnc UF ad + Oac M1 ape 1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGz o R3 d1 Mtnc UF ad + Oac M1 ape 1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGz o R3 d1 Mtnc UF ad + Oac M1 ape 1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGz o R3 d1 Mtnc UF ad + Oac M1 ape 1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGz o R3 d1 Mtnc UF ad + Oac M1 ape 1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGz o R3 d1 Mtnc UF ad + Oac M1 ape 1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGz o R3 d1 Mtnc UF ad + Oac M1 ape 1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGz o R3 d1 Mtnc UF ad + Oac M1 ape 1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGz o R3 d1 Mtnc UF ad + Oac M1 ape 1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGz o R3 d1 Mtnc UF ad + Oac M1 ape 1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGz o R3 d1 Mtnc UF ad + Oac M1 ape 1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGz o R3 d1 Mtnc UF ad + Oac M1 ape 1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGz o R3 d1 Mtnc UF ad + Oac M1 ape 1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGz o R3 d1 Mtnc UF ad + Oac M1 ape 1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGZ o R3 d1 Mtnc UF ad + Oac M1 ape 1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGZ o R3 d1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGZ o R3 d1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGZ o R3 d1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGZ o R3 d1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGZ o R3 d1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGZ o R3 d1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGZ o R3 d1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGZ o R3 d1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGZ o R3 d1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGZ o R3 d1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGZ o R3 d1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGZ o R3 d1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGZ o R3 d1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGZ o R3 d1 Phenf Gyo Zrf1 fb 01 XUKKZO / 1 Twdw XGZ o R3 d1 Phenf Gyo Zrf1 fb 01 Y 01 Phenf Gyo Zrf1 fb 01 Y 01 Phenf Gyo Zrf1 fb 01 Y 01 Phenf Gyo Zrf1 fb 01 Phbi9nXO/LXP92YzP1ZXA1inLgXs91XO8FYNuCYDN1UNeHGUbOSjOMY1d2UjM3Obo2dOu3ZBt1 b9nX0/LXP2 yzr1ZXA ImLgXsy1XOSr YNuCYDNUNeHGU60Sj0M y Id2UjM30bo2d0u3ZB1 ePfrTJ+OUJ+3WEs1LCdsby/2Y5e2RBe1b4/0/j6nsW3PxRu4d2TDt34HNnB3jH8DDVfPgWHj dODKNI0b0DeJ7NioOFgbd2cjNISP90YabYWbt4A/+HKbdXZnttrNwYc30HoT+HVHOIfbdzrq dQdiuHLv94bXd4lDtkSfdnwXuI3TNI6XtqQSajdsQDLYpghvwgU7iFwuC8ML96arRGfTinIj uZIvORoOeQw8ucMCAOWOseQZeSZUuZLXKpOPtpN7L5RTgCQ8TekoZhXcJJfeQ9k+ZZnbJcL +TaO0WVpz5jPeZ2nOZdHGaiSsZHPA52LJkQeQBzuJXYOel2Ob4yR6FPwZErVFPcRqJjOUpu aKDf+WzqQZhXOpyX/mS20NPX7WY0jnOQLr6srmOU3mcW3mZa9qm9aCWBzq7djme8wC1Fvmo W4GfOzqdj7ajezoo7Xqet4MhVzcYCTujnzmuq3BFEPGai28BNjt/LEQiL7qZ+zOa37CaK/ur Y915wnCii2ZTeLuqS7SNqLmkh3q5A3tlp3tTVHGOP3qdRjqxkPuvx3qZ13u+aLAp5Puua6xQ PL/SvitieFytsys63vnXl9MWHqdzuWC/duhsmnC/hEnX+pL/wvZks2kU4rzmzg/ezrzvB 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fdAGxqOEJahAwhPWwRcKFIb2eHNV6lNwT8Pj4AVAeMIjrnCIC4Bh1m64fqFCm7tALOIRS7jE F0aShrv1FxYzGAkEWEYzzjE9fYbirGMYNM2+AHV1jCB6GwhYOc4SHfGBg5DiaSQ6zkGJcF FgvoKJRPQOQpG1nHL8byj78AXAQoJsrxPMV28HNkJCTZxyR2chh+AhQ2J3hNJFhwleN85Tk3 2cQo3i5QIIY/Be9WUWQOtIzrLOShkhfB/jmDyNC4go5Z9kLj/ZyfA5d5Ddf2osvyjKQCb1m Y2MvVs1D/XUiOuwIK8PYzLyerp260+lKrOLUPNQ2nWXdHpYYOtVDYfG4XQ1rc9O4O5JWn6OV NWpdV3HT5O6xfLaq6jc7 + 935/q0EntzvPFM62N1WMsEtA1wLIHzdCg + 4nxmdZb1AnDQZoHUi to the second strength of the seconbM3wRu+bu9JON2Yn/vE/l2vQ8r6pupdNcRLA+Kl5nSK6b3ihae8zPE+uI3V9XKUz3zbLPf5 urtWcWcWEDWtOm/p51tdXw36/J/Nk8P/WXnf70G/ApA2ozQEMLQEwIV9jCMQiyCQyAUGQpbipZ t7QjLuB1sIt9xmRf5tkRl/ZlX8Rr4na7K3YYd7mHmO56tPua1R4WMXPd7xPwzwJ6PPeyF97qATi83gPOdbi72tU6gAXdVSh5vOcdFYn/QNfjDHjOG3sCG9gI2uVTebiQ3vQORv3caZiYf+ 5TOOPdwBLXbBl/OCG7cX7NtwHw2kcfZf/z3k6063DBiak2vnTuOG7/uwO//zqLPX9BHf9guY /u/NH3vkXRBA71S+5qwoxg7J/fjyP//ur8977C//gfYzXvMjSb3nzX5+2Bu9+1s+/gLaP205ORH cvRlcPlegPQ4 smPOrQCN jv8U jlLlLwf+bv6 yrPwGMOc8 xgBOOQCOhQfkzPCF sQCLE from the second state of thevB0rQAOUwO2bP8 prwt7bQCYwtsDhQuwQhzUQBnMvjPzQC9Mtwssoiwcwx4MvpUivhacNCdUarter and the second seconvgcMPCWsQgG4QSwUQ+YjQzfEQ6sLQtGbwyKSQ+C7wx9kwkFcwz5sQ0QEvTgUoRtgRBT8wORc wPojwagrRC10RP+DxCusPzXZKwEogvigmzj7uhgguyBT/qEMU4AoYyTVSQC2MyxsQ0UHU0VW DANX7CZYtDpZ3JwEMCJbhMEYLABeREZeNIFXjEXYU4NhdIFQw4C+2OHG28UU6EUycMb6gOYG CjhTRAC2mUDGKOcP1MZfjI9gfItoBMcqw0VkjAFznMCbUYx0jIB1NV2JMJwhMdkRMB6pEac wsdnBIB9RJt+zMZcXEVs9CjFuCxSKMg+EZ+fEeFjMVVZsZMZUgkbBrD9adAMixACLTEWG 1 Eh0 HDJSSL 81 GMa 9 ag RW + z CMb EiO3 EZ gZ Elvl EYSe Ii + u8 hrp Mlm BMa CPMh SJIbl cr + T7 KiU Strand StranrVzIjGxFjhTIaSLIpnTJo2oEt/PHk5TLoCy+u6RInjRGcjzLjQxKdcRJp9RJqCRM9zNHv7xKfterfinderpszKsUxIqZxKeqzJe8xHRNDKklzIrgzIzRzKyvzMmVRGaXtIsLRymRMshRHs+zLZUQ3iOTMlizNsjTJuJzNq5ymiAxM13zLO4xMm/Q0xfTM3IRLoJTMtWzNd0zO4eTN4mRNUcRN2NTN5ZxO 21SDtqxI6DTMpWzOrKzFVVAAtSk9E0DFbFP9Dw7unPM4jEvGtLnmIF9FTP9VSh/3vPFYjP UAzM/r3ju+ELl/xkz/20AfgkAPlctmG8D76JPrcLF0VxhfDQT/dE0P5UOP+kTAC9Ae+wgQGd OHsTUVD4AP7Oz4L0xg79UBPtOnMaUREdOHRD0aZU0QgYAha9zwKN0RWMPt/cUJBsQBwlzxZN zwLdSLPrUe5STBsd0vN0OSO1UBNF0CWtUQAYxRv1UCLV0SNtzylN0N+sUbycJha9PvwOOAtN OxyFOmw81Hr8QjUFOrxrUyctOjPdSC/cOEZlS7bLVC4tUD+1+AR8NQUt1/1DyjL4nNdIuPVAw vYFAbdP6IFM5zc9SrVQmFdQs9Q5bndBPmNMvrdNUZVNHJVQSlVQLoNNP5dBeJVRX9SoSHdBFflexepreserves and the second secTyB2rddoxdV4bdYgDVdNHdd//VZQXN+3dZcJdZANi2cOsbCKbSMwCKrVgTxQEEHTJ4alhB nQm+k9iKDdmLzdgv21gr9UaH4LsIDVmKHdlONNmTbVBVUNkBrdnwc1mNfSaO1VkC4EdqtFmg  $pcaX1dmTFVQh4MeINVGgldGSIwGYvVbeO1qE/kzaia3YmhVI6kqXflY3anp1akGVZ98Ra31zJinteration{context} \label{eq:context} pcaX1dmTFVQh4MeINVGgldGSIwGYvVbeO1qE/kzaia3YmhVI6kqXflY3anp1akGVZ98Ra31zJinteration{context} \label{eq:context} \label{eq:co$ ouVZpP1 als XZSCP amOX as 21 RsFV bp 6 OBWS3 bGV iEt 61 a keOmkp3 bYmVQrq1 VtN1 bjB3 avzWiet 61 avga bymVQrq1 VtN1 bymVQrq1 bymVQrq1 VtN1 bymVQrq1 VtN1 bymVQrq1 VtN1 bymVQrq1 VtN1 bymVQrq1 bymVQrq1 VtN1 bymVQrq1 VtN1 bymVQrq1 bymVQrq1 bymVQrq1 VtN1 bymVQrq1 biyJCvRzQuOVbw93axPVa/Aa9yzcnD3cO43cUqTakLVZDOjbpwVXqd3cwbVY1WwJv+VYNdPc 8yzdlXcg8zMzBXGh00+0oXbtIXdkmVbqPWavNRL3CVc0OVdOe1aCI3Q8BPex7Vb1o3YpRO+ uQ1 dAB3 d1 sX do MWA5W3 b5 nX dszv da ZJeDqVezm3 cws3 a2WVHt5V cv bVY3SWBqIBC8 eXe6H2mVezm3 cws3 a2WVHt5V cv bVY3SWB cws3 a2WVHt5V cv bVY3SWB cws3 a2WVHt5V cv bVY3SWB cws3 cws3 a2WVHt5V cv bVY3SWB cws3 a2WVHt5V cv bVY3SWB cws3 a2WVHt5V cv bVY3SWB cV bVY3SWB cws3 a2WVHt5V cv bVY3SWB cV bVY3SWB cws3 a2WVHt5V cv bVY3SWB cV bVY3SA QwuXF jszwNQUBfIM6A LABfw2AVT gAvOYATd4BPoYHwEYXATYTcVN70kSRQ2YQHgYA924XqDMarket All and a strength and a s4d+dYWqkxhS+4RXO4XULYWmc4F863h9e4ujDYXz8tqJVuCOm4BWwYBtY4h+OPpwi4qJVtSmu YBOO2AzO4lN9g+rqYim+USq24gzG4CDe4ic4hf+4io04zbWYCE+AA9oYTneYTpm4zYOYif+ 4D7GuT+24OC24UHWYUP22Do+YTdW5CHm4y5mNxhGYi2mxjsW5Ekcm5EpOYyR+ZCzG4OUu/uQi O+QTZuI85mIOtg9UFuMaVoBTZeUodmU1BmNIJuUV3mNP7uL/GuFQBuRYXmVKbmXfUthjmQVarNP4UFQBuRYXmVKbmXfUthjmQVarNP4UFQBuRYXmVKbmXfUthjmQVarNP4UFQBuRYXmVKbmXfUthjmQVarNP4UFqBuRYXmVKbmXfUthjmQVarNP4UFqBurqqbarNP4UfqBurqqbar1udaY2eIlmaDJucpi9obJQEqrmIBCOkb5mCnjQCdpeiNPmYN+GiRDukVIGkFPelKbjOO7tn6 bOmRXuGSlumZprSa9ugk1uIFe2mdxmfKQ+la+2meAmmhbokD/tjpo55pdvvpj9Zil+7PseXp T+YBqvZQkA5pcX7qmI7qnuZqcepolm5pohZrkybrre7ql8bptYbqGUBqj4Prr77qom7rupZq nz7rnk1rkZ7rse7rssZuYZpvrZzmgbsneyOvM5pttbqVoZrodbryXbrynZswc7DDFBsyq5largerenter and the second statement of the second staxFZrONZsOeZsr07svQ5tCJ5I1I5r015t067mhw3s1I7tzDbstxYnjxU3lc5txp5qzpZhqybsxfZrs64BtL7tpl5pug7uv1Zu24btwcYpqDjuw37tyJ5rM55thx7twQZtWYXu5F5u6sZsugZo ISzv6d7uOtbtzZZuoD5vyX5u5AZv/vQubPLG7/rWb6lubBeQ7p716AN4ageN6Q+G7/sWYQEn aw9X8QIX8QO38btG8Q9/cBt38Qk/7RnH8Bo/cB/n8NOOch4n8hpIcBwH8AZP8hFf8h+zZt5D8gzvcSk3cgp/8itXcib/7xy38iGP8i8Hc+EWcwOv8iY/cy4f8xs3czZPcSFP8yxfcxlvczov czAXqSrHcyzX8xhfXTT/8yn/7mPmhzkndCOHcuU+KhbP80JHaLNGchb/3jc38zuXcx7PakBf 8EEn8jeI/vSmzPQd73IyRz87n3Q/93JR70ZSp3FIX3Qq13FYV3Q7d+1PP3VZN/QA54daZ/Vd n3UG9wDljgCTrgEpb3VDZ3BkN/ZjT/ZgP21mL/Zj94APVnZJ571pt/BnNyNsH3Wz3nZjR3Zo X/MTF/duD4Bvd/VwD/BmH3dkv/ZoF3Z3p3Zyl3dzz3F0v3d1n/dlr3dn5/d1X29tB3h4L3c4 P3eDT/eBD+iCJ/eAj/d+z/fG3neJb3ige/h3Z3h/z3Z1X3iB73hw13h7v3iRZ3eSj3iET/ina3eIP3h8Z/k2yzqLX3mW/2sRfoOSt/mEx/16N+OQp3jh3vc3iHmZ9/mX7/as/jt5gv/4pA95 9d7smjf6m3f5jQ96mR96kDd5oUf6q+f6rPf6naf6oO8Arp4BbVd3ykN7HtDXrE8EsOf7tO93 va/8xZd8uaf8ut98zFd7zY/800d7yL97ztf7zP98Op/81Sf81u/81z/9vy/9xLf8snd90Wd9 1Lf90e993Td93L953+f92g/+2wd9rqb52R/+nsf8SUz+2Fd9tZdV2Ad+2d/9GQgB54fz1Hd847985P/9489+4Vd+85d+7Kf+859+8L/+xTf8BJj/cuGPf8Cn//oHffyP/OnD//wnfSBICBOA ovGITCqXy9xQyIxKpOXnk4rNVp9ErTdqHX7HyjCUjN5eO2hzlzl2w8ny+bdu1+Lz2D1/6vcH xiXYR1gIeIg4uLbI5Jbj+KgomRRYqSaGaUm5mXnmaXSJOYoVBAA7

Secondary+map image data for the zMap demo applet (Base64-encoded GIF image): (filename: world.mmp)

AAAA+DXAAAA5gAAfADNAADHAADBAAAA/QC5AACvAAClAACZAACLAAAawQAFIgAA7AB7AAAA rQAA2ABTAAA1AĂAA8gAAiAAA3gAA1gAAkQAÀEwAAvwAA1gAAlwD8AAD2AAAÀbwDoAAdgAAAA yAAA8wAAYQAA4gAAeAAAowBoAAAApgAAPAAAOQAA/AAAUwAA6AAAAAAAAAAAAAAAAAAAAAAAAAA hxAjSpxIsaLFixgzatzIsaPHjyBDihxJsqTIkyhTqlzIsqXLlzBjypxJs6bNi1Zy6tzJMyeV n1eCCh1K1GHPoOd/UhEaJQpRoUaRst2pNGjTq06hMpzKVafSn1ivxmnYtawVpWGbPgTD1qzU R2KBSQxJvMRAQ2VNTQ27moRoShN38Uuz16hEW4n1fMziPJgzmMxihkABggTdX5GDq5ySEpdl zKA5z03s8Exc0Ljdlj7D+jTq1FMfsp1t2LxrOaNjM5zN23Rj247TZJ4sdXdv3pjNACcTPrhj 4j2NHOdee7nz57Bzrp7e+zfw688b/nd2eJV7dzLKb+u1AhGreeroT0fW2/Due/jpM88HQz7s mab30XabaAzdFUWA57nGX4EGItidb5k99JcVVynlIHeYkaWYX0199dOF3UW14VVeWQiibyJy ZeKFjSXUVxZXwWjgjDQ2VdRAU9WoY41BEdRFWVjJuKOOYwnWxZFuxSjkkHcNhGRITS3JZBQ+ HmnllXVNCZiRV3b542BaEiSGGGx5aSWUUUi5JRRjijHGm29aYeaTfMOoZptuwjnXl2cmZoWa VArkGJ55vtmZnyPiJWhmhcI5xqGI/qXWoqGx5SgYjOLqZ6BQQHiaXnpmSllOX9YkKcDgvqo qKOaKhCq/gNiZ+mllMOZ3asCxvoapobONcacT+JqGny6YqZqqG/2qZ1AB5pX7K600trlQ069 9+xwmI4J55hHElRtgNdiRuiYBdnnYLhkjEvtjCeG2+a60oL4LLnMasmirvBq2SyCA+arb3n8 hubtwv2C6xhBFBJco7UH40ghoAp/S52TEVd8FRZWbrFFFFxY/K/GW2QMssdMggyyyCOTPKPJ hubtwv2C6xhBFBIco7UH40ghoAp/S52TEVd8FRZWbrFFFxY/K/GW2QMssdMggyyyCOTPKPJ XbCsrKQqXyWGySFfqbGZiVY8JsOnA1uqYgn/S6jNPQN7lNDjiuGly26XqvGQSeNpltNNtwxy x3dFnfScVNvcpclYN9WY1lpP3bXVNVuNFaNkRwOszSjXfJVrbZdtds80RxFr/1kL+OyyGhc y7fdR/K8ReDojj140jw3hXjigy60Z8oAQg6a5DunJaAaalie7uAFN+Zb555/njQUC7dW0tt4 ojSkrqsr7rq98Hs++7/EdsY5/iqnLvqZMAqcMyaq/64Y4jT1x;X6HhPBrKL6+j1AELf2Q UNCshRbX0yjQFl483b2d32scPhdcbBH2+JzynD766FNOPEGGq5/+1ffLr/BA9dMMv/95Ixib +le/9+VPYwfcGPYEsjMC9s+AYDtgjRg4LgcSMH75g9/90Lc97k2qbhZ8oPrs9z6TTUpcIAyh 4eLXOEqhcHAqdF/4NAYFXUkuhiYTiPPmtbgY6B5/sfbWw8dCAUg7tCG6YpcCnn2QyMGcW+X IxvN1uXE58V0azSs11WqCMTVMS56YeFi4J70LnqB8s5itGLixDAwJqVkjcXy17/eSMYISS+N ZLaiCa6cMico2i/dF2/max ZIAjGc6oMjq2iI/EE+MeAXk9I8qRfWEcSAc9iMg1LbKRTSLIFCZJyUlebyFbqKQm54fJTGpy kzr6qo4UQsBPenJ/pAyhKS3JpFTiUGOrnMIEEflk/n2Skos5yMxqactbylIhbdpCA3nJM18C c3Iau8AFiGmyTypEcYQC2TCJOcInRpFxwtxlLRdCNylm04fWFCIWvynM+oWTh1GTpjkTcsQ1 prOcIFOIINOZzŚwqxHHz/qTnzhiORTyia3IJoZEf3RXQ6dGxjhlaiJYOehqFRuyNCS1ozJwY ÎYSMr4t/tCj7nudQPHaOkQrBJUgRAsixUUSAHVFgKzliuB2NpH6zzEgŴvSfTV1pmI8zcQkqJ IYSMF4/ICJ/nudQPHaOkQrBJUgRAsrXUUSAHVFgKZinB2NpH62E/gMvSt1V1pmB2cQkqJ qZGcxrOnPGUpLznimKBmJDSvJCpSLdgRXRFQqc+ypOZsN9XSZWRtVL3IFiHXEayOU2AhMRBC QVKjOnJkSk/cyL8iipGldfVfHOGpWuV6VbrihCdVyKte91qFp2illkfhq2D1+hSLTGWwfC3s XQOL2LwqFrA6yasVGpvYoWQksoKdLGffSxG8Slavmm1skTCyF8SGdq8lyshcKHtaySSLtaul /ixqMXvUxsjWtUfBSHUyM1iuVEQ5wAWuY3pbnIt4J7jD5WtxKTId5JKhsTvRSK6ci61WvXYi Oznucmyr1/FUJEHaVZBgLJJdD6BHuJ9qCOa4o4Hz5sdY9FnvbKpwhiqY173vlRVbLtIbVUo uPnFzYKYyxu+OgbA1V1sfQXLGwTDd8AT2QllDyzc6yw2J7L973sx4tkJJ2c5hu1JhqkDnAtj uLGf8Q3wTNzaCUMoInaxmF8RYhYZ/xVhdSKRvm7sMDTB1SCRgtlKDbKcSE2JyNnZ1CgRUUQg CmvREauder(2ac14)UVCFUF2C6VU2DVCFUF2CFUF2DVCFUF2DVCFUF2DVCFUF2CFUF2DVCFUF2DVCFUF2CFUF2DVCFUF2CFUF2DVCFUF2CFUF2DVCfUF2DVCFUF2DVCFUF2DVCFUF2DVCFUF2DVCFUF2DVCfUf2DVCfUF2DVCfUf2DVfUf2DVCfUf2DVCfUf2DVCfUf2DVCfUf2DVfUf2DVCfUf2DVCfUf2DVfUf2D CzmXBEmykx+2poL4ilVTTlRCHjwZ6/oYIentspEnZZBYiTnIBXGe/n7202S+IAR4sWJzm8uS ZjXLRzIC1lRuC4lhMqxhQPPRb1cMYjBA4/nMtyJlu3TVZeu+edGp8lWRNbqve5k5VPeU2Lki zŠs2GiR1lg4zhNtYMHnZOVsHYVKoK5VqfUGarYd83aoHWRDrEWzTtMZxwiCm6vsODMiEsdh7  $\label{eq:cnkswols} CnksNo(5)Fh6Mi9l1JMoRRnSBlf4Zido5hBgWg+i7azBai0qtEpxnAdmrdr3Eq3eftl2iZf 287dpWo3aXDsTpJllJiOMTSK3d809tcYV297SwvfycaLmsUATTxF698A75bgxnVwOOGbPZCL 2012 and 2012 an$ 2rbcxC2/2QzO+iSUvaX2tZGpjnSwg/eO/gBk54jzrVvVykzJOek2LQKszyE/ncuZ56yYty5e 61 HAwt UaZ2yet Qzt+lseAc+OdvHFzIL5 i5vbIzZNuBmu41 cjWAXrVzizEy3tNPIm39t+s7+bOEBDvHvf7b54r4flhYRzYOML6PbIme7khP+b+xCoGtiTu52B5v4uok5ZM70q54vfTC1WT89 OEBDvHvt7b54r4fhYRzYOMLOPblme7khP+b+xCoGtiTlt52B5v4uok5ZM70q54vt1C1W189 3kb1hLJA643lctgHEJ+uF2fpaRjGMebR5jCcEUL/2bahD5/4g4q1fVAfu6WnBaNW9RhrmB/H 06qR9kFO/kPx/qj9iQKx+4Gk3vrAxpbxk59/sJwCyBh5SYPU75HScz9Mm7KFDlq7IPWboeHs 71b890//9sMz/Md+MYV+tZRAGgN/NGWar5RACIIA5DMQdVdLAEhAVcYmpudTXrCBxXRKnEJB 9eRT9VNJBQF5ISiCIDMFZRYagieCJTlggbcNMBnF8JohN4DQQuad77/RUBFFJreDU9SDEJVx ptdqBOWDLFhBrdZPDEV8wURqvXeE1Hca71IuBiWFNLiEQ4KFU5hrM7dQUlhRUFgxR/hrX9hH 82SFJERRn1Z11KOGWgc9kiRLYFcQWE0HxsYQJVUEkEze6gvE1FMtwSIfZiC4RJgvOEL10 iCKFEVJwUw6hQozIShfYSa80iZVoibxESSn4U5GIgpnERBABiqIIEUVFilL1GfTmUxJBehMY QhGhg6xHRKa4cMFEiw7hORmYigyRg2WUQ+2BeOiILxHhVbS3Og+BRj6ILhIhfMvYL824hRTV UNEIhsdohv2xfahXjGiIfzUjdy4PNUojsEYf+VIjiGGWYLFWRwhYaLFY5d1Yrc1Wh9xW5VV j/aoVyCRj45Fjx6RjyPBjyQBkAEpkPvIj1XwEQCmHPbIHhuxkMBFXDoREsEFXRPZEQ3GkI01 EqzBAwbJEf0FkB4BPAiZkB4BPAiZkCBpGiUZEqxhj602ESPpkhzx/pL6GMyCZMaUZM2eZMv6RHyiFgR mVcZtREtxlcAllc82ZM+iV4d4Y6D5WAfoY6C5ZQcxhXr6Fc3AhFmAVqEZZU9AmNZWVlcKRGD sVdAYZVeGSlleQVZMRG5kRhVoZZkthZTBhYVkR24xRUcoigS0WSz1RVNQSEUkWSfdZdHkzAT SWARZ version of Zamed vZamed vZamed Skni vozakli Zamed Vkrez 4 krece of Saw Vick Vozakli Zamed Vzamed V zamed Y+YXURdJCTFn5PaXS3YQHIpjBQiiTTqhEchkJepjekmitelkAhn1SVIInpOoYInomFkNIoZ m6Gbo6kaCbFykaGbpPGjuvMph6ZneOaktaMeR9qjOaWk+1ksYHCjl6losimlMgqlV3obQdqi wVlnQceleWabbUhyYQoam4EY39h0vakexilPNNdzbvpR5oJrlTIXcAp08gJWlEZ0J4IqdIpz

> IPR2013-00292, IPR2013-00293, IPR2013-00294 and IPR2013-00295 Petitioner Microsoft Corporation - Ex. 1095, p. 17

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#### -continued

## Secondary+map image data for the zMap demo applet (Base64-encoded GIF image): (filename: world.mmp)

dsqf/tWjMJamEPoWBReAoFTwH5oWnww6IeeJFR7iqC+HIQyalzFiYlcpoeDmMfAoohXTlU6inffAoohXTonbloh5aoQJRJskGJmHiI4eBblnCay+6qmXipGBCq1bGK3GSZZKiJgZhcKyCq6K6mDXOHKHS $\label{eq:linear} Im02JC/4YHqSovK2mAqSZOjqZorGal2GKIQWLo1GrEnaKUZ3p9IqFlZapNiKaJNZn9yKrjzBZ+fyZ1gqKmOQaFqOafBqZrz6b2W6p+E6K3niaWVqpnJ6aaOzho86sJ/yJnBII38Kg2bUfXUqIAvba4MKa8KGsF7oOznXhllAq7RTn0AmdZhaJcrWPQSKbD+zIR3rsREz/lqyKilBw7KvSm3a$ 1Gyo11LXJjYp658wc7MaWjXV1rOAOG4Nmpc+C4LdZjTylqHvtjXnppizJHE097RQuyVac3Av 66p6SW9tgrUOCyUuxG/aEi1E625hCxoNdym/ArSxEa7YES35WrbRZTmzkrZT2zS44jI1a7c+ A6604bbitXEwMHEVdyX1Ajzs+YPm1gX1qq5EyHFfuKVOSCixhrHFQrLneLBJd7LVKGuW203g x6Ztehuhq7lRqnSlWzyS+2vLwzCeIhBMSzLZBrqwG7sxkyBc8nVgdwVYcG2LR35RYDWtWnU1 UzTNJm3C+7V9sTyzKLe20yVJu3hK+61aIm4i/pNt7gY1Ttt3VOuf3rNuCbezORMWSWMB4xK+ rZoTjrdvn4e+pRIFlVeDdRO+hdcF5UGFqnc30tszemNDpcc1hWcyjwu+eFc4o604Itd2lUMG IOculydybmcandPACLxuKtUsKudFdQNGtQ04+Bs1fESepaMunotxHsw64CfCiZO6s/u3z5KG cvc1z6u9t6h4cYMl/g092zt4W2x4QJw1BDx59dt4eDd3MPpPAaXzGUdx36INV+es3TBN68cu126u9t6h4cYMl/g092zt4W2x4QJw1BDx59dt4eDd3MPpPAaXzGUdx36INV+es3TBN68cu126u9t6h4cYMl/g092zt4W2x4QJw1BDx59dt4eDd3MPpPAaXzGUdx36INV+es3TBN68cu126u9t6h4cYMl/g092zt4W2x4QJw1BDx59dt4eDd3MPpPAaXzGUdx36INV+es3TBN68cu126u9t6h4cYMl/g092zt4W2x4QJw1BDx59dt4eDd3MPpPAaXzGUdx36INV+es3TBN68cu126u9t6h4cYMl/g092zt4W2x4QJw1BDx59dt4eDd3MPpPAaXzGUdx36INV+es3TBN68cu126u9t6h4cYMl/g092zt4W2x4QJw1BDx59dt4eDd3MPpPAaXzGUdx36INV+es3TBN68cu126u9t6h4cYMl/g092zt4W2x4QJw1BDx59dt4eDd3MPpPAaXzGUdx36INV+es3TBN68cu126u9t6h4cYMl/g092zt4W2x4QJw1BDx59dt4eDd3MPpPAaXzGUdx36INV+es3TBN68cu126u9t6h4cYMl/g092zt4W2x4QJw1BDx59dt4eDd3MPpPAaXzGUdx36INV+es3TBN68cu14000t6h4cYMl/g009t6h4cYMl/g092x4W2x4QJw1BDx59dt4eDd3MPpPAaXzGUdx36INV+es3TBN68cu14000t6h4cYMl/g009t6h4cYMl/g009t6h4cYMl/g009t6h4cYMl/g009t6h4cYMl/g009t6h4cYMl/g009t6h4cYMl/g009t6h4cYMl/g009t6h4cYMl/g009t6h4cYMl/g009t6h4cYMl/g009t6h4cYMl/g009t6h4cYMl/g009t6h4cYMl/g009t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g009t6h4cYMl/g009t6h4cYMl/g009t6h4cYMl/g009t6h4cYMl/g009t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g000t6h4cYMl/g000t6h4cYWl/g000t6h4cYMl/g000t6h4cYWl/g000t6h4cYWl/g000t6h4cYWl/g000t6h4cYWl/g000t6h4cYWl/g000t6h4cYWl/g000t6h4cYWl/g000t6h4cYWl/g000t6h4cYWl/g000t6h4cYWl/g000t6h4cYWl/g00t6h4cYWl/g000t6h4ckkPHeNNS/Zt6/wt6/jeTd1FwfLDHcRbki378x4ZzjZxbyLfnexUMQ208jLIYgw1CyQ5bNwuDKar Herrer, 200 mar, 201 milliplickola 304-222 Lavy Entero In 2200 Hwild Solwud GRNMwbV3c4IKK57MQ+mildPXGE/OdOFSurlywnZ0sSp2wjBcarTxRMczy2h1RF2Ey9oIBUrs hrxsMdmTdT4sEAYEvMM8Qgj0y5e0QivUPeVTS9b2Spk3xmEyi2bXP9WMK+IQ2h3zKM0TtrM TAaCgTG4dtUMQOu3PWIjvOCYzZRHQqOXhIkXQxIEQ1RYcPUMd+BTRK7oyCEOyF34wLb3VIz8 z6pnOEXOjJUsyfHEhND3yUvOhQxde3i8c844jWvEb5nbe3lOOGukfGKFPCD9wmSIOBU9/sNo OIQ63D1NGMzSyIbkZ0gdvYZyCNNyxcyQFM3tTIDtx4BXUX8+z2tKMCTAjiczOnD/myNP+Y0AP aM2qGkIs9D8JdBdDDYm8NNX/I4D810tZfIAbhEFcvRgnSExa/YAv+s7M9NSeNBBiW9bEBIAq SBD0LM4ueLaJbIPb9EONfM43WNKv59c8uNCA3dBfDYxNxEWRnIFWyNKLrVNQ6NgVDNkZnU8/ aLDPJ9mXO7FXWIakK9I7woWOW9Nz1IQZdVH+hNnhx4agvTzfNxA6vVGwHdsm1drQ7H+ciIc/ LX+eNEmwtNv+14FObFfOQOyodBAiWCOiVKsMiII4G9yk6NuZ/lTOwXrYKLiHujRM20xTxlTd cC2CmnQQF93NzDTXK/jWuyiD4o3Q3w2L693Xes1UM4jJ423dQTjfiJzJjMN7COFPA+yJZarZ 8DOzeerZtrhPnC2MA9XIWljZC466Dd7ZDw5rqh3apt2etu1GLB3hK32MHF5I09SnayjiO20Q 1FjiBYGIKH4QvnR/DNHbgyjMnwjjMU7cCdFMk3jiz62JfpjjOk7drmRBPv7jH3jjm5jjmcjb 5c2 IDrHdS + 5MDJHeORXejPHAJkPeKsSY8 it NTj7Y3PTBIYjliP3 IDc3 IXr5 IOrd3/VPlwGff to the second state of the second state ofvVjYfT3mmZbSOgfZ9QHRGq1za2qM/pYdR3ue2X10jX8uUIot6IMeOxGN4R9OMHI+56tNqBV+YTwxCJQ+KKDGB2RFQ1szaIQ7bqtJUJHJF6S2hgQPBxzFW4TBuJJBCkzJbaszhOFKJLPGTmRKZ1Spp2zJ1ktCaqRKa3TGq4weJ0xFKKjH7sJGbtwasOyzcixL9PpKcYwCtASkhNjI5R0vcgy+ jyRGA+yut3TDuhTIKMrLOgzEdDzISrtHKAxFdfzJ+kHDUPxHhkRMCaNDjaTHxsw7i3ygJFxM 6avLwyS5ypS2+bvMwszDqVPHjtSOAATNONxM/iNbxYQMTSODSozMyZCMSaE8ZCMSaE8zc8ESTekzdpO ydtszZjTzVScSVisydC5StjERDF4yH4OSflBZTtZSYS3OVKCReLaQedMQaWSXbebTS6Zt+MX zqA016wMFfBEyvGcmPKMRpDbSu/sM69sTOOLPYXQgsrOPYXgAvrkRr8ssvzcuIXYAi9oyP4M tP8ssgCFROVTCLgkTdLESwVNx9FUzVisr7n8S9UkzSzOpAoNScCM0EREKpNOzdGcSG8ETMCk z/oUlYQYKBGVTA/tOC1IORVtsBatxI6UOLzzpUWEzBolOY6cAgxDzoHsUeLOTCEdUhFVCFUc O9QMxYQITpykUScF/s4lFU6IhMkn5c5X5FHmpDIt1UA6tKLoKE/q7Mf2TE/B+y34zA4yxTK0 WsrOPM6Ryco43U7kWlPOqdORcU/wXI2Nu8rsZMJqDNT4vM+xXAgUtVGMe9CYyO9FnS6GaFRC Q1G5LNB9jASKjalInbsAHdÊYTVS33FTp61Rx3MtPfVQDs9RHZNDDNVERdVe2tDCvNFWhdFT NSUBI9LNbFXsyxUWJVK7fMQHmtE2BFZC8wJkJbkpWFZpUk7FNFZlNaYjXU5ojU4dZVIkTVIl rcArDUOl3c3D69Y6/NbglFOVpNbfXIg27Uk6vEcxjVMwXU4xHVN43VI1dbg6NVfLe1Og/szX Kk2ygkJPf2XKcZIGf22j82TTegUUPr1Ofu0paixYbZQ9iQW5hWhLTb1YjA1VRI3WCYVUJIDW LZiCRgXZhpBHLYjRvjzZVW3UTEWfjiBSUBWekC3MZK1DWM2V/QxNZCVVc7SlsQpRaK1Ljx3Z qA1awqzWmFtWpp2ChhBXpW1ajnBWoa1WZvUgqq1aYMXaaX1W15xaKy3W2WyIf3VJLsU+soVS di3WpOWIdY3S6HPXFpYbjXJJ0JJPa1ba83OgZ3JgN3JvmXGv9XOff24wYWag/2ohKXXPp3T xSXP6TxcqXzPig00iq3cBGWIZdW93Idi22IpvVcB43ZkQ1d/tHNWNJVVqYNSEnyiEck2aKN y1RN3cKMXcfKpYlOtU9XaDNXWNt2tLtXQTSWmA1Xc/1CDRM2t81304QWws4xeVlWo/I2qh1 2rnBSKdD1x6dXmw927G9XtbkUeWdu44o2wQcSOLtUoZQlW7hNXpLziOtc27jdW+PBW56UX/UN IzRd2+Dp1/3Nrf41lcIVzwBWmrwlo7sdH7ot4DpqXDwi1AYWRgaeLiVMYPecYLPkCKb1Tw1u 2kXtCONNS5YoMuPl3UObCkIr4Q2uI6dYWhVeYQ113VB8YSD9mhEWURrG3ZrVXRXWWd/IYRUe CpNMXxwuYZv41S3AAGgNXZtQTkIj/uLatV7ujc1nheJxHYrureLxRdsmDtcqfsQurltq3eKh OFdPFNsihd+bjNe2vRj7ZV+cpN8AflvhdGPAdWAdlBgDpuM7tWOt4eMHrl+DXWPHteAIxko9 puDa9GNF fruGyWBGr1SPMGERBmEPlmSWCOGVtYoU1uRQUwsSzmGYBeVOpuEatmFOxj5ThmFcleEZXmXhdWXXNGUfptOifmGw2OIatVO5ZgmYO+VdvlqrgDyl7WVooeKtTZDTtOIr5o/wZeb3 HWa 4nVIsZmMydgqq 3NIObhhChrIhCcZu7kmnEOD77c6AIdxw3ii1 + M5yRthxHuRsXudrROR3 + M5yRthxHuRSXUR3 + M5yRthxHuRsXUR3 + M5yRthxHuR3 + M5yRthxHuRsXUR3 + M5yRtInwEFBOI/nXkcx7deubnSO4pq2BI1AWLU+ZYu3BhSp5dwlBlgUblhWboSwYVKahlm3DD1Q3 il60iR5WsJDHiy7lgIZRUg5NXnZMxijmbUZhlM7FVC5my6gIl2YMmTDWlwaxGq3pZS5MmW4x edxpccJSuwDXn2bpdxZqcbIMxjXji5JnhYVjxSkNyHXqPiaMP5bq6IFqrRRqpFYjcGWMkKJA r55crK60rR5ofCbrbwbosZZohS4NvwyVjdbhOuhVU4nro3XrnV1aBLBrkZ7rOJwYt+7RWLUM YOVovO5mwlZavKSWvJbVFm1sadvexi4QbcXrB9HpyVYcasbpF4pmyw43Y5brr2HE62Ac7bCm V3SCbMA9Rsjm27JtbQhGSXUmba1E4LJWYMWl6jq66sZmYdj27d4Gbrc26N8ebNh+5FY+7v9E KuXeYdm9m+P+WYpe7JNsblUFY+tm10+Nm/N7rzGbuvG70Ymg8pW7pLoae/2TC5ObyM9b/JN b9b07msab25S7pHM4+KWP9DLbofM7fSuuqn2blOx7eZWGv9ubeEJZNWmWfZua+t26P9mbvtm cLAICAAAOw=

An alternative exemplary implementation according to an <sup>60</sup> embodiment of the present invention could use a small (30K) Tcl-based client applet similar to that described above which downloads and runs within the user's Web browser page but where the image data is not downloaded to the client computer but instead is remotely manipulated by the <sup>65</sup> user. For example, the image data could be too large to download to the user. Such an applet would, for example,

open a socket communications channel to a remote visualization server that stores and manipulates three dimensional image data. When the user makes a change to the controls in the applet GUI, such as to specify rotation around an axis, the remote visualization server would perform that computation on the data and transfers the resultant data display back to the user for viewing the result of the manipulation within the display frame of the client applet. The user could,

for example, slice through the data at any angle and click upon any voxel on any slice surface to cause the associated descriptive text to be shown in the lower widow of the applet, for example in the manner described above. The efficiency of this type of system is such that object identification and response occurs in nearly "real time" with identification speeds of, for example, approximately ½ second over 56 KB Internet connections.

What is claimed is:

**1**. A method for associating specified program actions <sup>10</sup> with locations in images viewed on a computer system, the method comprising the steps of:

- displaying a two-dimensional representation of a multidimensional image on a computer screen, with locations in the two-dimensional image specified by values of first and second coordinates which are x and y coordinates specifying locations in a single frame of a video clip,
- selecting a particular location on the two-dimensional representation having particular values of the first and

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second coordinates which determines a multidimensional coordinate including at least a third coordinate value which is a time dimension of the video clip;

- creating a secondary image map, having entries correlating to values of the first, second, and third coordinates, with each entry holding a pointer value;
- when the particular location of the two-dimensional representation is selected, accessing a selected entry of the secondary image specified by the particular vales of the first, second, and third coordinate to retrieve a selected pointer held by the selected entry;
- utilizing a retrieved selected pointer to access hot program actions associated with the particular location in the two-dimensional image.

\* \* \* \* \*