**Changes to MASS for exchangeBoundary()**

**Constants.java**

**ADD**:

 public static final int EXCHANGE\_BOUNDARY = 16;

**Message.java**

**ADD**:

 // Exchange Boundary Variables

 private Vector<int[]> EB\_DESTINATIONS = null;

 private int BNDRYLENGTH;

 private boolean WRAPEDGES;

 // Create ExchangeBoundary Message

 public void **createExchangeBoundaryMessage**( int functionId, Vector<int[]> destinations )

 {

 ACTION = Constants.EXCHANGE\_BOUNDARY;

 FUNCTION\_ID = functionId;

 EB\_DESTINATIONS = destinations;

 }

 public ArrayList<RemoteExchangeRequest> **getExchangeBoundaryMessage**() {

 return (ArrayList<RemoteExchangeRequest>) this.message.get(Constants.EXCHANGE\_BOUNDARY);

 }

 public Vector<int[]> **getEBDestinations**() { return EB\_DESTINATIONS; }

 public int **getBndryLength**() { return BNDRYLENGTH; }

 public boolean **wrapEdges**() { return WRAPEDGES; }

**UPDATE:**

 public void **createInitializationMessage**(int[] size, String arrayType, String placeType, int handle,

 String className, Object argument,  **HashMap<Integer, String> networkMap,**  HashMap<String, Integer> nodePidMap,

 int dlbCnt, boolean historyBased, boolean windowBased, boolean slopeBased) {

 ...

 NETWORK\_MAP = networkMap;

 ...

 }

 ***to***

 public void **createInitializationMessage**(int[] size, String arrayType, String placeType, int handle,

 String className, Object argument, HashMap<String, Integer> nodePidMap, **int bndryLength, boolean wrap,**

int dlbCnt, boolean historyBased, boolean windowBased, boolean slopeBased ) {

 ...

 BNDRYLENGTH = bndryLength;

 WRAPEDGES = wrap;

 } ...

**REMOVE:**

 private HashMap<Integer, String> NETWORK\_MAP = null; // map of user array index, host name responsible

 public HashMap<Integer, String> **getNetworkMap**() { return this.NETWORK\_MAP; }

**MProcess.java**

**ADD:**

 case Constants.EXCHANGE\_BOUNDARY:

 //log("=============Calling ExchangeBoundary: FuncID: " + m.getFunctionId()+ "=============");

 PLACES.exchangeBoundary(1, m.getFunctionId(), m.getEBDestinations());

 //log("=============Finished ExchangeBoundary: FuncID: " + m.getFunctionId() + "=============");

 break;

**UPDATE:**

 PLACES = new Places(m.getHandle(), m.getClassName(), m.getArgument(), m.getSize());

 ***to***

 if( m.getBndryLength() > 0 ) {

 PLACES = new Places( m.getHandle(), m.getClassName(), m.getArgument(), m.getBndryLength(), m.wrapEdges(),

 m.getSize());

 log("Initialization - Shadow Boundaries Enabled");

 } else {

 PLACES = new Places(m.getHandle(), m.getClassName(), m.getArgument(), m.getSize());

 log("Initialization - Shadow Boundaries Disabled");

 }

**REMOVE:**

 MASS.networkMap = m.getNetworkMap();

**MThread.java**

**ADD:**

 else if (MASS.STATUS[0] == MASS.STATUS\_EXCHANGE\_BOUNDARY)

 {

 MASS.eb\_exchangeBoundary();

 MASS.eb\_update();

 }

**RemoteExchangeRequest.java**

**ADD:**

 private Boolean shadowBoundary;

public **RemoteExchangeRequest**( int destIndex, int bndryIndex, Object outMsg )

 {

 shadowBoundary = true;

 destinationGlobalLinearIndex = destIndex;

 originGlobalLinearIndex = bndryIndex;

 inMessageIndex = -1;

 outMessage = outMsg;

 }

 public Boolean isBoundaryRqst() { return shadowBoundary; }

 public int getBndryIndex() { return originGlobalLinearIndex; }

**UPDATE:**

 public RemoteExchangeRequest( int destIndex, int origIndex, int inMsgIndex, Object outMsg )

 {

 shadowBoundary = false;

 destinationGlobalLinearIndex = destIndex;

 ...

**Places.java**

**ADD:**

 41 private int boundaryWidth;

 42 private int totalBoundaryLength;

 43 private boolean wrapEdges;

 44 private Place[] lBoundary;

 45 private Place[] rBoundary;

**Overload Constructor:**

 74 public Places( int handle, String className, Object argument, int... size ) throws Exception

 75 {

 76 this( handle, className, argument, 0, false, size );

 77 }

91 public Places( int handle, String className, Object argument, int boundaryWidth, boolean wrapEdge, int... size )

 throws Exception

92 {

112 this.boundaryWidth = boundaryWidth;

113 this.totalBoundaryLength = boundaryWidth;

114 this.wrapEdges = wrapEdge;

115 lBoundary = null;

116 rBoundary = null;

**Update:**

120 for (int elem = 0; elem < size.length; elem++)

121 {

122 if (size[elem] < 1) { throw new Exception("size value less than 1");}

123 totalLength \*= size[elem]; //multiply by each element to eventually get the total length

129 }

138 // now divide work up and store the all the information in a map

139 chunkSize = totalLength / MASS.systemSize;

140 remainder = totalLength % MASS.systemSize;

***to***

120 for (int elem = 0; elem < size.length; elem++)

121 {

122 if (size[elem] < 1) { throw new Exception("size value less than 1");}

123 totalLength \*= size[elem]; //multiply by each element to eventually get the total length

124

125 // Calculate chunksize and remainder. Dividing the first dimension for each machine

126 if( elem == 0 ) {

127 chunkSize \*= size[elem] / MASS.systemSize;

128 remainder \*= size[elem] % MASS.systemSize;

129 }

130 else {

131 chunkSize \*= size[elem];

132 remainder \*= size[elem];

133 }

134

135 // Multiply by each element after the 1st dimension (boundaryWidth)

136 // to get total boundary size

137 if( boundaryWidth > 0 && elem > 0 ) {

138 totalBoundaryLength \*= size[elem];

139 }

140 }

**Places.java** *(continued)*

**ADD:**

169 // Print Shadow Boundary information

170 if( totalBoundaryLength > 0 ) {

171 MASS.log("Boundary Shadowing : ON");

172 MASS.log(" \* Boundary Width : " + boundaryWidth);

173 MASS.log(" \* Total Bndry Length : " + totalBoundaryLength);

174 if( wrapEdges ) MASS.log(" \* Boundary Wrapping : ON \n" );

175 else MASS.log(" \* Boundary Wrapping : OFF \n" );

176 }

177 else {

178 MASS.log("Boundary Shadowing : OFF !\n");

179 }

**REMOVE:**

203 for(; globalLinearIndex < chunkSize; globalLinearIndex++)

204 {

205 MASS.networkMap.put(globalLinearIndex, masterRankHostName);

206 }

207

208 MASS.log("Populated master rank " + masterRankHostName +

209 " info on the network map. Total elements so far: " + MASS.networkMap.size());

210

211 // please note that # of mNode is systemSize - 1, since the master is not a part of mNodes.

212 for(int mNodeId = 0; mNodeId < MASS.systemSize - 1; mNodeId++)

213 {

214 hostName = MASS.mNodes[mNodeId].getHostName();

215 MASS.log("Populated rank " + (mNodeId + 1) + " hostname: " + hostName

216 + " info on the network map. Total elements so far: " + MASS.networkMap.size());

217

218 int rankEndOffset = globalLinearIndex + chunkSize;

219 for(; globalLinearIndex < rankEndOffset; globalLinearIndex++)

220 {

221 MASS.networkMap.put( globalLinearIndex, hostName);

222 }

223 if(mNodeId == MASS.systemSize - 2) // last rank gets more work

224 {

225 for(; globalLinearIndex < totalLength; globalLinearIndex++)

226 {

227 MASS.networkMap.put(globalLinearIndex, hostName);

228 }

229 }

230 MASS.nodePidMap.put(hostName, mNodeId + 1);

231 }

232

233 // DEBUG

234 System.err.println("Created network map... Total Elements now = " + MASS.networkMap.size()

235 + " now sending information to remote nodes");

**Update:**

212 **m.createInitializationMessage**(size, arrayType, placeType, handle, className, argument, **MASS.networkMap,**

213 MASS.nodePidMap, dlbCount, DLBParams.HISTORY\_BASED, DLBParams.WINDOW\_BASED,

 DLBParams.SLOPE\_BASED);

***to***

212 **m.createInitializationMessage**(size, arrayType, placeType, handle, className, argument, MASS.nodePidMap,

213 **boundaryWidth, wrapEdges,** dlbCount, DLBParams.HISTORY\_BASED, DLBParams.WINDOW\_BASED,

 DLBParams.SLOPE\_BASED);

**Places.java** *(continued)*

**ADD:**

242 // Setup and Init the Left Shadow Boundary

243 int tmpIdx, k;

244 if( (MASS.myPid == 0 && wrapEdges) || MASS.myPid > 0 ) {

245 lBoundary = new Place[ totalBoundaryLength ];

246

247 for( int i = 0; i < totalBoundaryLength; i++ ) {

248 synchronized( placeInitIndex )

249 {

250 // Note: getGlobalArrayIndex() adds offset of current machine to k when calculating

251

252 if( MASS.myPid == 0 ) // wrapped edge

253 k = (MASS.systemSize \* chunkSize) + remainder - totalBoundaryLength;

254 else

255 k = i - totalBoundaryLength;

256

257 placeInitIndex = getGlobalArrayIndex( k, size );

258 placeInitSize = size.clone();

259 Place plc = (Place)ctor.newInstance( argument );

260 lBoundary[i] = plc;

261 }

262

263 if( i == 0 )

264 MASS.log("Left Boundary - First Location: " + (k + offSet) );

265 if( i == (totalBoundaryLength - 1) )

266 MASS.log("Left Boundary - Last Location: " + (k + offSet) );

267 }

268 }

269

270 // Setup and Init the Right Shadow Boundary

271 if( (MASS.myPid == MASS.systemSize-1 && wrapEdges) || MASS.myPid < MASS.systemSize-1 ) {

272 rBoundary = new Place[ totalBoundaryLength ];

273

274 for( int i = 0; i < totalBoundaryLength; i++ ) {

275 synchronized( placeInitIndex )

276 {

277 // Note: getGlobalArrayIndex() adds offset of current machine to k when calculating

278

279 if( MASS.myPid == MASS.systemSize-1 ) // wrapped edge

280 k = i - offSet;

281 else

282 k = i + chunkSize;

283

284 placeInitIndex = getGlobalArrayIndex( k, size );

285 placeInitSize = size.clone();

286 Place plc = (Place)ctor.newInstance( argument );

287 rBoundary[i] = plc;

288 }

289

290 if( i == 0 )

291 MASS.log("Right Boundary - First Location: " + (k + offSet) );

292 if( i == (totalBoundaryLength - 1) )

293 MASS.log("Right Boundary - Last Location: " + (k + offSet) );

294 }

295

296 }

**Places.java** *(continued)*

**ADD:**

314 /\*\*

315 \* Returns Hostname from a global index location.

316 \* @param gIdx the global index of the location to look up

317 \* @return a string that represents the hostname of the global index loc provided

318 \*/

319 public String **getHostname**( int gIdx ) {

320

321 // Verify the provided info is valid

322 if( gIdx < 0 || gIdx >= totalLength )

323 return null;

324

325 // Loop through each entry of the nodePidMap (node PID map)

326 for( Map.Entry< String, Integer > entry : MASS.nodePidMap.entrySet( ) )

327 {

328

329 // Calculate the entry : PID, first place location, and last place location

330 int pid = entry.getValue( ); // pid

331 int fLoc = pid \* chunkSize; // fist place location

332 int lLoc = ((pid+1) \* chunkSize ) - 1; // last place location

333

334 // Add remainder to last location

335 if( pid + 1 == MASS.systemSize )

336 lLoc = totalLength - 1;

337

338 if( fLoc <= gIdx && gIdx <= lLoc )

339 return entry.getKey();

340 }

341 return null;

342 }

586 /\*\*

587 \* **New ExchangeBoundary Funcation**

588 \* @param handle the handles associated wtih a destination array

589 \* @param functionId the identifier of a method to call

590 \*/

591 public void **exchangeBoundary**( int handle, int functionId, Vector<int[]> destinations )

592 {

593 MASS.eb\_setup( this, functionId, destinations, lBoundary, rBoundary );

594 MASS.eb\_exchangeBoundary();

595 MASS.eb\_update();

596 if (DLBParams.WINDOW\_BASED || DLBParams.HISTORY\_BASED || DLBParams.SLOPE\_BASED) {

597 methodCounter++;

598 doLoadBalancing();

599 }

600 }

601

602 /\*\*

603 \* Get Boundary Width

604 \* @return the boundary width (first dimension)

605 \*/

606 public int **getBoundaryWidth**( )

607 {

608 return boundaryWidth;

609 }

**MASS.java** *(continued)*

**ADD:**

 55 static final int STATUS\_EXCHANGE\_BOUNDARY = 7;

 73 // exchangeBoundary variables

 74 protected static Places eb\_places;

 75 protected static int eb\_functionId; // function to execute

 76 protected static int[][] eb\_destinations; // the neighbor list

 77 protected static Place[] eb\_lBoundary; // left shadow destinations

 78 protected static Place[] eb\_rBoundary; // right shadow destinations

**REMOVE:**

104 protected static HashMap<Integer, String> **networkMap**  = new HashMap<Integer, String>();

**Update:**

756 static void ea\_exchangeAll()

757 {

 ...

804 // get the host name

805 String destHostName = **networkMap**.get( globalLinearIndex );

***to***

805 String destHostName = ea\_places.**getHostname**( globalLinearIndex );

**MASS.java** *(continued)*

**ADD:**

 843 /\*\*

 844 \* **Exchange Boundary - Setup**

 845 \* called by a MASS.Places object to set up the static variables for exchangeBoundary

 846 \* @param eb\_places the MASS.Places object to be used for the exchangeBoundary call

 847 \* @param ea\_functionId the function number that will be passed in to callMethod

 848 \* @param lBoundary the Left Shadow Boundary array

 849 \* @param rBoundary the Right Shadow Boundary array

 850 \*///---------------------------------------------------------------------------------------

 851 static void **eb\_setup**( Places places, int functionId, Vector<int[]> destinations,

 852 Place[] lBoundary, Place[] rBoundary )

 853 {

 854 if (!INITIALIZED) return;

 855

 856 // Print exchangeBoundary setup message

 857 MASS.log("\nRunning ExchangeBoundary Setup (eb\_setup)");

 858 if( lBoundary != null ) MASS.log(" \* lbSize: " + lBoundary.length );

 859 else MASS.log(" \* lbSize: NULL ");

 860 if( rBoundary != null ) MASS.log(" \* rbSize: " + rBoundary.length );

 861 else MASS.log(" \* rbSize: NULL ");

 862

 863 // Setup Global variables

 864 MASS.eb\_places = places; // the handle for this Places

 865 MASS.eb\_functionId = functionId; // callMethod function number

 866

 867 // Convert destinations from Vector<int[]> to int[][] array, then

 868 // set the MASS.eb\_destinations variable to the new int[][] array

 869 Object[] tmp\_destinations = destinations.toArray();

 870 MASS.eb\_destinations = new int[ tmp\_destinations.length ][ ];

 871

 872 for (int i = 0; i < tmp\_destinations.length; i++) {

 873 MASS.eb\_destinations[i] = (int[ ]) tmp\_destinations[i];

 874 }

 875

 876 // Set the left and right Shadow Boundary variables

 877 MASS.eb\_lBoundary = lBoundary; // Left Shadow Boundary

 878 MASS.eb\_rBoundary = rBoundary; // Right Shadow Boudary

 879

 880 // Master Node Sends exchangeBoundary commands to all nodes

 881 if(myPid == 0) {

 882 Message exgMsg = new Message();

 883 exgMsg.createExchangeBoundaryMessage( functionId, destinations );

 884

 885 for( MNode node : mNodes ) {

 886 MASS.log("Sending eb\_setup (" + exgMsg.getAction() + ") message to "

 887 + node.getHostName() + " (pid=" + node.getPid() + ")" );

 888 node.sendMessage(exgMsg);

 889 }

 890 }

 891

 892 // Wake-up all threads

 893 synchronized (STATUS) {

 894 STATUS[0] = STATUS\_EXCHANGE\_BOUNDARY;

 895 STATUS.notifyAll();

 896 }

 897 }

**MASS.java** *(continued)*

**ADD:**

900 /\*\*

 901 \* **Exchange Boundary - Main Function**

 902 \*///---------------------------------------------------------------------------------------

 903 static void **eb\_exchangeBoundary**()

 904 {

 905 // The Shadowed Place

 906 Place shdwPlace;

 907

 908 // Get thread information

 909 int numThreads = threads.size() + 1;

 910 int threadNumber = getThreadPosition();

 911

 912 // Get Boundary information

 913 int lbSize = (eb\_lBoundary == null) ? 0 : eb\_lBoundary.length;

 914 int rbSize = (eb\_rBoundary == null) ? 0 : eb\_rBoundary.length;

 915 int totalBndrySize = lbSize + rbSize;

 916 int maxBndrySize = (lbSize > rbSize) ? lbSize : rbSize;

 917

 918 // Verify system has been initialized and at least one of the shadow boundaries exists

 919 if ( !INITIALIZED || totalBndrySize == 0 ) return;

 920

 921 // Loop through all of the shandow boundary locations (left and/or right)

 922 int bndryIdx = threadNumber;

 923 while( bndryIdx < totalBndrySize )

 924 {

 925 // Get shadow boundary place

 926 if( bndryIdx < lbSize ) shdwPlace = eb\_lBoundary[ bndryIdx ]; // Left Boundary

 927 else shdwPlace = eb\_rBoundary[ bndryIdx - lbSize ]; // Right Boundary

 928

 929 // Get shadow global linear index location and the destination hostname

 930 int shdwGlobalLinearIdx =

 931 Places.getGlobalLinearIndexFromGlobalArrayIndex( shdwPlace.index, eb\_places.size() );

 932 String destHostName = eb\_places.getHostname( shdwGlobalLinearIdx );

 933

 934 // Create a new request

 935 RemoteExchangeRequest request = new RemoteExchangeRequest( shdwGlobalLinearIdx, bndryIdx, null );

 936

 937 synchronized(exchangeAllRequestMap)

 938 {

 939 if(exchangeAllRequestMap.get(destHostName) == null) {

 940 ArrayList<RemoteExchangeRequest> requests = new ArrayList<RemoteExchangeRequest>();

 941 requests.add(request);

 942 exchangeAllRequestMap.put(destHostName, requests);

 943 } else {

 944 exchangeAllRequestMap.get(destHostName).add(request);

 945 }

 946 }

 947 //MASS.log("ExchangeBoundary 'exchangeAllRequestMap' size : " + exchangeAllRequestMap.size());

 948 bndryIdx += numThreads;

 949 }

 950

 951 // Process the Remote exchange requests with the remote nodes

 952 barrier();

 953 processRemoteExchangeRequest( );

 954 barrier();

 955 }

**MASS.java** *(continued)*

**ADD:**

958 /\*\*

 959 \* **Exchange Boundary - Update Function**

 960 \*///---------------------------------------------------------------------------------------

 961 static void **eb\_update**()

 962 {

 963 if ( !INITIALIZED ) return;

 964 MASS.log("Starting Exchange Boundary Update...");

 965

 966 // Create Places Iterator for the places assigned to this thread

 967 int[] thrdRange = getLocalRange( eb\_places );

 968 Places.Iterator origin\_iter = eb\_places.iterator( thrdRange );

 969

 970 if ( origin\_iter != null ) // null when not enough MASS.Place objects for thread

 971 {

 972 int[ ] size = eb\_places.size( );

 973 Place origin; // for caller MASS.Place

 974 Place dest; // for callee MASS.Place

 975 int in\_msgs\_len = eb\_destinations.length;

 976

 977 while ( origin\_iter.hasNext( ) ) // go through this thread's range

 978 {

 979 origin = origin\_iter.next( );

 980 if ( origin.inMessages == null || origin.inMessages.length != in\_msgs\_len ) {

 981 origin.inMessages = new Object[ in\_msgs\_len ];

 982 }

 983 int inMessagesIndex = 0;

 984

 985 // Loop through all of the destinations (neighbors)

 986 for ( int dest\_i = 0; dest\_i < in\_msgs\_len; dest\_i++ ) {

 987

 988 // fill dest\_coords

 989 int[] neighborCoord =

 990 Places.getGlobalNeighborArrayIndex( origin.index, eb\_destinations[ dest\_i ], size );

 991

 992 // If a Valid Destination, update destination information in inMessages

 993 if ( neighborCoord[0] != -1 ) {

 994

 995 int globalLinearIndex =

 996 Places.getGlobalLinearIndexFromGlobalArrayIndex( neighborCoord, size );

 997 int destinationLocalLinearIndex =

 998 Places.getLocalLinearIndexFromGlobalLinearIndex( globalLinearIndex );

 999

1000 // **On Destination Machine**

1001 if( ( 0 <= destinationLocalLinearIndex ) &&

1002 ( destinationLocalLinearIndex < eb\_places.length() ) )

1003 {

1004 dest = eb\_places.get( destinationLocalLinearIndex );

1005 origin.inMessages[ inMessagesIndex ] =

 dest.callMethod(eb\_functionId, origin.outMessages);

1006 }

1007

1008 // **Left Shadow Boundary**

1009 else if( ( destinationLocalLinearIndex < 0 ) &&

1010 ( eb\_lBoundary.length + destinationLocalLinearIndex < eb\_lBoundary.length ) )

1011 {

1012 dest = eb\_lBoundary[ eb\_lBoundary.length + destinationLocalLinearIndex ];

**MASS.java** *(continued)*

1013 origin.inMessages[ inMessagesIndex ] = dest.outMessages;

1014 }

1015

1016 **// Right Shadow Boundary**

1017 else if( ( destinationLocalLinearIndex >= eb\_places.length() ) &&

1018 ( destinationLocalLinearIndex - eb\_places.length() ) < eb\_rBoundary.length )

1019 {

1020 dest = eb\_rBoundary[ destinationLocalLinearIndex - eb\_places.length() ];

1021 origin.inMessages[ inMessagesIndex ] = dest.outMessages;

1022 }

1023

1024 **// Error - not found**

1025 else {

1026 origin.inMessages[ inMessagesIndex ] = null;

1027 }

1028 }

1029

1030 // Invalid Destination, coordinates outside this MASS.Places

1031 else {

1032 origin.inMessages[ inMessagesIndex ] = null;

1033 }

1034

1035 inMessagesIndex++;

1036 } // end of destination for loop

1037 }

1038 MASS.log("Exchange Boundary Update Complete!");

1039 }

1040 barrier();

1041 }

**Update:**

1185 static ArrayList<RemoteExchangeRequest> **doRemoteExchangeAll**( ArrayList<RemoteExchangeRequest> requestList )

1186 {

1187 Place destination;

1188 ArrayList<RemoteExchangeRequest> retList = new ArrayList<RemoteExchangeRequest>();

1189

1190 for(RemoteExchangeRequest request : requestList)

1191 {

1192 destination = ea\_places.get(

1193 Places.getLocalLinearIndexFromGlobalLinearIndex( request.getDestinationGlobalLinearIndex() ));

1194 Object returnMessage = destination.callMethod( ea\_functionId, request.getOutMessage() );

1195 RemoteExchangeRequest returnReq = new RemoteExchangeRequest( request.getDestinationGlobalLinearIndex(),

1196 request.getOriginGlobalLinearIndex(),

1197 request.getInMessageIndex(),

1198 returnMessage);

1199 retList.add(returnReq);

1200 }

***to***

1186 static ArrayList<RemoteExchangeRequest> **doRemoteExchangeAll**( ArrayList<RemoteExchangeRequest> requestList )

1187 {

1188 Place destination;

1189 RemoteExchangeRequest returnReq;

1190 ArrayList<RemoteExchangeRequest> retList = new ArrayList<RemoteExchangeRequest>();

1191

1192 for( RemoteExchangeRequest request : requestList )

1193 {

1194 int tmpDestGlbLinIdx = request.getDestinationGlobalLinearIndex();

1195 int tmpDestLocLinIdx = Places.getLocalLinearIndexFromGlobalLinearIndex( tmpDestGlbLinIdx );

1196

1197 // If request is a exchangeBoundary request

1198 // ----------------------------------------

1199 if( request.isBoundaryRqst() ) {

1200

1201 if( eb\_places == null ) { MASS.log("\*\*\* ERROR: eb\_places == null \*\*\*"); System.exit(-1); }

1202 destination = eb\_places.get( tmpDestLocLinIdx );

1203 Object returnMessage = destination.callMethod( eb\_functionId, request.getOutMessage() );

1204

1205 // Create a new return request to send back the return values

1206 returnReq = new RemoteExchangeRequest( request.getDestinationGlobalLinearIndex(),

1207 request.getOriginGlobalLinearIndex(),

1208 returnMessage );

1209 }

1210

1211 // If request is an exchangeAll request

1212 // ----------------------------------------

1213 else {

1214 destination = ea\_places.get( tmpDestLocLinIdx );

1215 Object returnMessage = destination.callMethod( ea\_functionId, request.getOutMessage() );

1216

1217 // Create a new return request to send back the return values

1218 returnReq = new RemoteExchangeRequest( request.getDestinationGlobalLinearIndex(),

1219 request.getOriginGlobalLinearIndex(),

1220 request.getInMessageIndex(),

1221 returnMessage );

1222 }

1223 retList.add(returnReq);

**Update:**

1232 static void **updateInMessages**( ArrayList<RemoteExchangeRequest> requestList )

1233 {

1234 Place origin;

1235 ArrayList<RemoteExchangeRequest> retList = new ArrayList<RemoteExchangeRequest>();

1236

1237 for(RemoteExchangeRequest request : requestList)

1238 {

1239 origin = ea\_places.get(

 Places.getLocalLinearIndexFromGlobalLinearIndex(request.getOriginGlobalLinearIndex()));

1240 origin.inMessages[request.getInMessageIndex()] = request.getOutMessage();

1241 }

1242 }

 ***to***

1232 static void **updateInMessages**( ArrayList<RemoteExchangeRequest> requestList )

1233 {

1234 Place origin;

1235 ArrayList<RemoteExchangeRequest> retList = new ArrayList<RemoteExchangeRequest>();

1236

1237 for(RemoteExchangeRequest request : requestList)

1238 {

1239

1240 // If request is a exchangeBoundary request

1241 // ----------------------------------------

1242 if( request.isBoundaryRqst() ) {

1243

1244 int idx = request.getBndryIndex();

1245 int lbSize = (eb\_lBoundary == null) ? 0 : eb\_lBoundary.length;

1246

1247 // Determine the shadow boundary location (left or right), then retrieve it

1248 if( idx < lbSize ) origin = eb\_lBoundary[ idx ];

1249 else origin = eb\_rBoundary[ idx - lbSize ];

1250

1251 // Update the shadow boundary outMessage variable with the retrieved value

1252 origin.outMessages = request.getOutMessage();

1253 }

1254

1255 // If request is an exchangeAll request

1256 // ----------------------------------------

1257 else {

1258 origin = ea\_places.get(

1259 Places.getLocalLinearIndexFromGlobalLinearIndex(request.getOriginGlobalLinearIndex()));

1260 origin.inMessages[request.getInMessageIndex()] = request.getOutMessage();

1261 }

1262 }

1263 }

**Update:**

2296 private static void agentsManageAllPerThreadKillOrStartMigrate()

2297 {

 ...

2343 String destHostName = networkMap.get(globalLinearIndex);

 ***to***

2343 String destHostName = ( ea\_places != null ) ? eb\_places.getHostname(globalLinearIndex)

2344 : ea\_places.getHostname(globalLinearIndex);

**NO CHANGES**

Agent.java

Agents.java

ExchangeHelper.java

MNode.java

Place.java

RemoteAgentRequest.java

Utilities.java