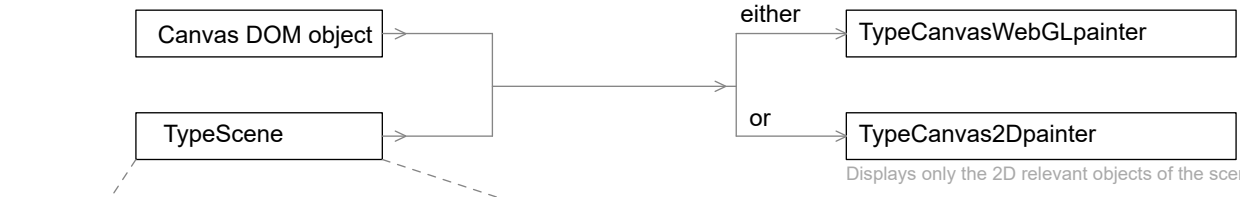
CONCEPTUAL OUTLINE OF THE FRAMEWORK



TypeScene

Camera
TypeCamera

Lights array
TypePointLight
⋮

Global catch-all appearance defaults
(This object is guaranteed to have all appearance properties defined)
TypeSceneObjectAppearance

SceneObjects array
TypeSceneObject
⋮

Materials array
(a pool of all scene materials)
TypeLegacyMaterial
⋮

Textures array
(a pool of all scene textures)
TypeImage
⋮

TypeCameraOperator
-Intended to handle camera movements such as panning, or (in the future) curve motion such as roller coster, etc

TypeCamera

Note: There are three levels of properties:
a) Scene level (guaranteed to be fully defined)
b) SceneObject level (declared, but initially empty)
c) Piece level (optional)

If piece level properties are not defined, SceneObject level appearance properties are used

If sceneObject level properties are not defined, scene level appearance properties are used

TypeSceneObject
-an object is made of pieces and each piece can (optionally) have custom properties
-a piece is either a curve, or a surface, or a text
-the pieces and propertiesForPiece arrays are not synchronized
-properties and geometry are separated to allow linking (same properties for multiple geometry)
-allows instancing (Multiple scene objects sharing geometry)

Pieces array
TypeCurve or TypeSurface or TypeText
⋮

PropertiesForPiece array
TypeSurfaceProperties or TypeCurveProperties or TypeTextProperties
⋮

Material for the sceneObject
(all sceneObjects are initially created with an appearance whose properties are declared but empty; causing a fallback to the scene level master appearance)
TypeSceneObjectAppearance

TypeSurface
- Can be construction aware (no vertices)
(holding steps to construct out of curve objects)
- or can hold actual verticies

TypeCurve
- Can hold literal vertices
- or can be represented computationally/mathematically
- can hold multiple disjoint curves/fragments
(eg can be used to hold an entire grid of lines as a single object)

TypeSurfaceProperties
Kept separate for linking purposes:
same geometry different normals (eg normal maps, etc)

TypeSurfaceNormals
TypeSurfaceTextureCoord

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THIS FRAMEWORK (CURRENTLY) DEFINES THE FOLLOWING OBJECTS

BasicLib.js

GLOBAL FUNCTIONS
- IsArray (thisThing)
- IsString (thisThing)
- GetCSScolor (ColorArr)
- XOR (a,b)
- ArrCompare(arr1,arr2)
- Say (userSays,elementID)
- ClipValue (x,max,min)
- PaddedNumber (num,totalDigits,padding)
- GetPathComponents (customPath)

OBJECT DEFINITIONS
- TypeSlider (trvLength,T,asSpring)
- TypeOscillator (periodOrAny,repeat,waveShift,startAtTime)
- TypeColor (userX,userG,userB,userA,clipTo,scaleTo)
- TypeKinematics(x,y,z)
- TypeXYZw (X,Y,Z,W)
- TypeBoundingBox ()
- TypeCentroid ()
- TypePlane (p1,p2,p3)
- TypeTmatrix (incomingData)
- TypeCamera()
- TypeCameraOperator (camera)
- TypeText(str)
- TypeCurve()
- TypeSurface()
- TypeSurfaceNormals(targetSrf)
- TypeSurfaceTextureCoord(targetSrf)
- TypeLegacyMaterial(syncAlpha)
- TypeSceneObjectAppearance (isMasterLevel)
- TypeSurfaceProperties (targetSrf, normalsRef, textureUVsRef)
- TypeCurveProperties (targetCrv,crvColor, crvThickness, crvDashPattern)
- TypeTextProperties (targetTxt,fnt,sze,alU,alV,clr,outline,outlnProp)
- TypePointLight()
- TypeSceneObject(fromParent)
- TypeScene()
- TypeFile (sourceFilePath)
- TypeImage (sourceFilePath)
- TypeOBJFileLoader (sourceFilePath)

Algorithms.js

OBJECT DEFINITIONS
- TypeNode (newData)
- TypeEdge (n1,n2,w)
- TypeLinkedList (sourceList,idx1,idx2,deleteFromSource)
- TypeDelaunayTriangulation (sourceBoundary)
- TypeHashGrid (subD, maxP, minP)
- TypePriorityQueue (isMax, compareFunction)
- TypeMazeGenerator (dim)
- TypeRedBlackTree (compareFunction)

CanvasObjects.js

Note: Grey items in this list are stand-alone (do not interact with the framework)

GLOBAL FUNCTIONS
- InitCanvas(CanvasHandleStr)

OBJECT DEFINITIONS
- TypeProgressBar (fromPoint, toPoint, width, barColor, backColor, outThickness, outColor)
- TypeCanvasText (thisText,txtSize,txtFont,atX,atY,txtColor,txtAlign,txtBase,useBack,backColor,padding)
- TypeTextLabel (thisText,txtSize,txtFont,pos,txtColor,txtHorAlign,txtVerAlign,backColor,padding,isRounded)
- TypeCanvasWebGLpainter (scene,canvasIdString,vertexShaderPath,fragmentShaderPath)
- TypeCanvas2Dpainter (scene,canvasIdString,clearColor)

SYNTAX/CODING CONVENTIONS

- All variable names start with small letter (non-caps)
- All Methods are capitalized except the toString method
- All variable and method names are descriptive (can be multiple words merged together)
- Brackets follow the Allman style
- if-blocks and for-blocks with short statements can be condensed to one line
- Limited to no if-nesting. Reworking the logic so that only top-level if blocks exist as much as possible
- Encapsulation: Classes predominately contain a private properties and methods section with Setter and Getter methods used to access them.
- Each method performs basic argument checking at the top
- Error reporting is handled on the spot by the most relevant method that catches it.
- Classes begin with the prefix "Type" (as in declaring a type)
- Classes are defined using prototype functions in one go (no methods or properties added later in different sections of the project)
- No code blocks will appear as arguments of a function (eg no anonymous function being passed as arguments etc).
- Functions and their parameters are kept on a single line

CLASS STRUCTURE template

```
function TypeClassName (arguments)
{   //Description:

    //PRIVATE properties

    //PRIVATE methods
    var Initialize = function (arguments) {}

    //PUBLIC methods

    //Initialization
    Initialize(arguments);
}
```

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CURRENT METHODS BREAKDOWN FOR EACH OBJECT

OBEJCT PUBLIC METHODS (from BasicLib.js)

- **TypeSlider** (trvLength,T,asSpring)
  - IsActive ()
  - IsInMotion ()
  - IsStowed ()
  - IsExtended ()
  - UpdateState()
  - GetDeploy()
  - GetState ()
  - GetPosition ()
  - GetDeflection ()
  - GetCondition ()
  - GetMaxTravel ()
  - toString ()
- **TypeOscillator** (periodOrAny,repeat,waveShift,startAtTime)
  - GetTimer ()
  - GetPeriod ()
  - GetMaxCycles ()
  - GetOffset ()
  - GetCounter ()
  - GetState ()
  - GetIsActive ()
  - Restart ()
  - Stop (state)
  - SetEqualTo (other)
  - Set (X,r,o,t)
  - toString ()
- **TypeColor** (userX,userG,userB,userA,clipTo,scaleTo)
  - MultiplyWith (scalar)
  - GetArrRGB (isRaw,norm)
  - GetStrRGB (isRaw)
  - GetCSScolor (isRaw)
  - GetR (isRaw)
  - GetG (isRaw)
  - GetB (isRaw)
  - GetA ()
  - GetAlpha ()
  - GetMaxRange ()
  - GetArrHSL ()
  - GetCSScolorHSL ()
  - GetCopy ()
  - SetAsPercent (isPercent)
  - SetMaxRange (newRange, resize)
  - SetR (newR)
  - SetG (newG)
  - SetB (newB)
  - SetA (newA)
  - SetColor (X,newG,newB,newA,clip,scaleTo)
  - SetEqualTo (otherColor)
  - TransitionTo (otherColor,percent)
  - IsEqualTo (otherColor)
  - toString ()
- **TypeKinematics**(x,y,z)
  - Update (isLiveUpdate)
  - HasRotation ()
  - HasTranslation ()
  - GetMass ()
  - GetElasticity ()
  - GetFriction ()
  - GetDatumPos ()
  - GetAngleCounter ()
  - GetTranslationVel ()
  - GetRotationVel ()
  - GetTmatrix ()
  - GetSavedTmatrix (i)
  - GetPos ()
  - GetFuturePos ()
  - SavedTmatrixPop ()
  - SetMass (m)
  - SetElasticity (el)
  - SetFriction (fr)
  - SetDatumPos (x,y,z)
  - SetTranslationVel (x,y,z)
  - SetRotationVel (x,y,z,w)
  - SetTmatrix (tm)
  - SetSavedTmatrix (i,tm)
  - SaveTmatrixPush (tm)
  - StartAngleCounter ()
  - ClearAngleCounter ()
  - Reset ()
  - ResetTmatrix ()
  - DeleteTmatrixHist ()
  - ApplyTo (point)
  - toString ()
- **TypeXYZw** (X,Y,Z,W)
  - DotProduct (v)
  - CrossProduct (v)
  - MutualOrtho (v)
  - Minus (v)
  - Plus (v)
  - Length (v)
  - ScaleBy (scalar)
  - ResizeTo (newLength)
  - AngleXY ()
  - AngleYZ ()
  - AngleXZ ()
  - AngleTO (v)
  - ProjectONTOvec (v)
  - ProjectONTOpln (a, b, c)
  - ExtendRayToPln (r,a,nrm,cl)
  - TestRayToRect (r,a,b,c,cl)
  - ExtendRayToLne (r,a,b,st)
  - CircumCenter (a,b)
  - AsOrthoTo (v)
  - RotAboutX (angle)
  - RotAboutY (angle)
  - RotAboutZ (angle)
  - RotThruPoint (pt,angle)
  - RotAboutAxis (axis,angle)
  - IsCoplanar (a, b, c)
  - IsCollinear (a, b)
  - IsScalarOf (v)
  - IsRightOf (a, b, n)
  - IsOrtho (v)
  - IsZero ()
  - IsEqual (v)
  - IsNaN ()
  - ReflectAbout (v)
  - Homogeneous ()
  - GetMax ()
  - GetMin ()
  - Get (idx)
  - GetCopy (dim)
  - GetAsArray (dim)
  - GetTolerance ()
  - SetTolerance (newE)
  - SetInt (dim)
  - SetMax (v)
  - SetMin (v)
  - SetX (newX)
  - SetY (newY)
  - SetZ (newZ)
  - SetW (newW)
  - Set (v,dim)
  - SetEqualTo (any,y,z,w)
  - toString ()
- **TypeBoundingBox** ()
  - GetMin ()
  - GetMax ()
  - GetDim ()
  - Reset ()
  - Update (newPoint)
  - toString ()
- **TypeCentroid** ()
  - GetPosition ()
  - GetWeight ()
  - Reset ()
  - Update (newPoint)
  - toString ()
- **TypePlane** (p1,p2,p3)
  - IsProper ()
  - IsStarted ()
  - IsEmpty ()
  - IsNaN ()
  - IsFailed ()

CURRENT METHODS BREAKDOWN FOR EACH OBJECT

GetA ()
GetB ()
GetC ()
GetUnitU ()
GetUnitV ()
GetNormal ()
GetBoundUVrec ()
GetBoundUVdim ()
GetUVcoord (point)
GetBoundMin ()
GetBoundMax ()
GetZdepth ()
Clear ()
Set (p1,p2,p3)
Has (query, isDurable, endCount)
toString ()

TypeTmatrix (incomingData)
MultiplyWith (B)
RotateAboutX (angle)
RotateAboutY (angle)
RotateAboutZ (angle)
Rotate3D (u,angle)
Rotate2D (angle)
Translate (dX,dY,dZ)
GetRow (rowIdx)
GetColumn (colIdx)
GetCopy ()
Inverse ()
Transpose ()
SetIdentity ()
SetZero ()
SetRotateAboutX (angle)
SetRotateAboutY (angle)
SetRotateAboutZ (angle)
SetRotate2D (angle)
SetRotate3D (u,angle)
SetTranslate (dX,dY,dZ)
SetSwapRows (rowA, rowB)
SetEqualTo (other)
SetRow (rowIdx, rowData)
SetColumn (colIdx, colData)
toString ()

TypeCamera()
SetNearPlaneDist (newDist)
SetFarPlaneDist (newDist)
SetFOVdiag (radAngle)
SetFOVy (radAngle)
Move (newTarget, isDelta)
Zoom (deltaRadAngle)
RotateX (radAngle)
RotateZ (radAngle)
SetViewport
(width,height,maxZ,minX,minY,minZ)
IsTopView ()
SetOrthoMode (state)
SetFocalLength35 (newLength)
SetViewTop ()
SetViewFront ()
SetViewRight ()
SetViewPerspective ()
UpdateViewMatrix ()
UpdateProjectionMatrix ()
GetViewportDim ()
GetViewportMatrix ()
GetCameraPlane ()
GetNearPlaneWidth ()
GetNearPlaneHeight ()
GetFocalLength ()
GetFarPlaneDist ()
GetFocalLength35 ()
GetEyePos ()
GetTargetPos ()
GetAspect ()
GetUpDirection ()
GetIsOrtho ()
GetViewMatrix ()
GetProjectionMatrix ()
GetImageCoordForPoint ()
toString ()

TypeCameraOperator (camera)
GetKinematics ()
GetCamera ()
GetScreenPosOf (point)
SetBounds (minB,maxB)
ResetPosition ()
Update ()

TypeText(str)
SetText (newText)
SetPlane (a,b,c)
GetText ()
GetPos ()
GetPlane ()
GetZdepth ()

TypeCurve()
IsClosed ()
IsPlanar ()
RegenPlanarCheck ()
SetAsPoint ()
SetAsLine ()
SetAsInterpolated ()
SetAsBezier ()
SetAsBspline ()
SetAsPolyline ()
GetBoundingBox ()
GetCentroid ()
GetVertexCount ()
GetVertex ()
GetComputedVertArr ()
GetZdepth ()
GetPlane ()
GetType ()
AddParticle (position,velocity)
AddPoint (newPoint)
AddVertex (newVertex)
AddCircle (centerPoint,radiusPoint,rudderPoint,arcAngleRad,viewingDistance)
AddEllipse (centerPoint,radiusPoint,rudderPoint,arcAngleRad,viewingDistance,asCircle)
AddRegularNgon (centerPoint,radiusPoint,rudderPoint,sideCount)
AddRectangle (pointLL, pointLR, topPoint, cornerRadius, viewingDistance)
toString ()

TypeSurface()
RegenPlanarCheck ()
IsDerivative ()
IsPlanar ()
GetZdepth ()
GetPlane ()
GetCentroid ()
GetBoundingBox ()
GetVertexCount ()
GetMeshSize ()
GetMeshTriCount ()
GetEdgeCount ()
GetVertex (vertIdx)
GetMeshValue (meshIdx)
GetVertexFromMesh (meshIdx)
GetType ()
GetBoundingCurves ()
GetMeshTriangle (triIdx)
AddFillFromPlanarBoundary (bCurve)
AddVertex (newVertex)
AddMeshFace (idx1, idx2, idx3, idx4)
AddTriangle (vert1,vert2,vert3)
ReverseMeshTriangleWinding ()
EliminateVertexSharing ()
toString ()

TypeSurfaceNormals(targetSrf)
GetNormalsCount ()
GetNormalAtVertex (idx)
IsTargetSurface (otherSrf)
GetTarget ()
FlipNormals ()
GenerateNormals ()
SetNormalVec (newNormal,idx)

TypeSurfaceTextureCoord(targetSrf)
IsTargetSurface (otherSrf)
GetTarget ()
GetUVsCount ()
GetUVatVertex (idx)
SetUVatVertex (newCoord,idx)
ProjectPlanar (bottomLeftP, bottomRightP, topLeftP, tMatrix)

CURRENT METHODS BREAKDOWN FOR EACH OBJECT

TypeLegacyMaterial(syncAlpha)
- SetKa (R,G,B,A,p)
- SetKd (R,G,B,A,p)
- SetKs (R,G,B,A,p)
- SetTf (R,G,B,A,p)
- Setd (newd)
- SetNs (newNs)
- SetColor (R,G,B,A,p)
- SetTexture (newTxtr)
- IsLinkedAlpha (state)
- toString ()

TypeSceneObjectAppearance (isMasterLevel)
- SetIsVisible (state)
- SetRespondsToLight (state)
- SetShowWireframe (state)
- SetSeeThruWireframe (state)
- SetShowEdges (state)
- SetShowFullColor (state)
- SetColor (R,G,B,A,p)
- SetWireProperties (newProp)
- SetEdgeProperties (newProp)
- SetCurveProperties (newProp)
- SetTextProperties (newProp)
- SetMaterial (newMtl)
- GetShowFullColor ()
- GetShowWireframe ()
- GetSeeThruWireframe ()
- GetShowEdges ()
- GetMaterial ()
- GetIsVisible ()
- GetRespondsToLight ()
- GetWirefameProperties ()
- GetEdgeProperties ()
- GetCurveProperties ()
- GetTextProperties ()
- GetWireframeColor ()
- GetEdgeColor ()
- GetCurveColor ()
- GetColor ()
- toString ()

TypeSurfaceProperties (targetSrf, normalsRef, textureUVsRef)
- GetIsVisible ()
- GetTarget ()
- GetTexture ()
- GetMaterial ()
- GetNormals ()
- GetTextureUVs ()
- GetWireProperties ()
- GetEdgeProperties ()
- GetWireframeColor ()
- GetEdgeColor ()
- GetWireThickness ()
- GetEdgeThickness ()
- GetWireDash ()
- GetEdgeDash ()
- GetColor ()
- GenerateNormals ()
- SetWireProperties (newProp)
- SetEdgeProperties (newProp)
- SetMaterial (newMtl)
- SetTextureUVs (newUVs)
- SetNormals (newNorms)
- SetIsVisible (state)
- ProjectPlanar (bLeft,bRight,tLeft,newMaterial,tMatrix)

TypeCurveProperties (targetCrv,crvColor, crvThickness, crvDashPattern)
- GetIsVisible ()
- GetTarget ()
- GetColor ()
- GetThickness ()
- GetDashPattern ()
- SetIsVisible (state)
- SetColor (newColor)
- SetFillColor (newColor)
- SetThickness (newThickness)
- SetDashPattern (newDashPattern)

TypeTextProperties (targetTxt,fnt,sze,alU,alV,clr,outline,outlnProp)
- GetIsVisible ()
- GetTarget ()
- GetFont ()
- GetSize ()
- GetColor ()
- GetAlignment ()
- GetOutlineProperties ()
- SetOutlineProperties ()
- SetIsVisible (state)
- SetFont (fnt)
- SetIsOutline (state)
- SetIsWraping (state)
- SetHorAlign (alU)
- SetVertAlign (alV)
- SetColor (clr)
- SetSize (sze)
- IsOutline ()

TypePointLight()
- GetIsActive ()
- GetIsRelativeToCam ()
- GetIntensity ()
- GetColor ()
- GetPosition ()
- SetActive (newState)
- SetIsRelativeToCam (newState)
- SetIntensity (newValue)
- SetColor (newColor)
- SetPosition (newPos)
- toString ()

TypeSceneObject(fromParent)
- SetHasTexts (state)
- SetHasCurves (state)
- SetHasOpenSurfaces (state)
- HasTexts ()
- IsPlanar ()
- HasOpenSurfaces ()
- IsChild ()
- IsPlanar ()
- GetZdepth ()
- GetPlane ()
- GetLastModified ()
- GetParent ()
- GetDefaultAppearance ()
- GetDefaultMaterial ()
- GetKinematics ()
- GetPieceIdxByName(lookupName)
- GetPiece (query,needIdx)
- GetPropertiesForPiece(query,apparent,needIdx)
- GetMaterials ()
- GetPieceCount ()
- GetPropCount ()
- AddPiece (newPiece,newPieceProperties)
- AddPropertiesForPiece (query)
- AddPieceProperties (newPieceProperties, query)
- SetDefaultMaterial (newMtl)
- SetAsModified ()
- AddGrid (unitLength, unitCountX, subdivisions, color1, color2)
- ProjectPlanar (pieceQuery,bLeft,bRight,tLeft,newMaterial)
- EliminateVertexSharing ()
- toString ()

TypeScene()
- AddMaterial (newMtl)
- AddTexture(newTexture)
- AddLight (newLight)
- AddObject (newObj)
- AddImagePlane (sourceFile,pointLL,pointLR,topPoint,preserveAspect,scale)
- AreTexturesStillLoading ()
- GetCamera ()
- GetObjectCount ()
- GetTextureCount ()
- GetMaterialsCount ()
- GetLightsCount ()
- GetDefaultMaterial ()
- GetDefaultAppearance ()
- GetAmbientLight ()
- GetLight (query,asI)
- GetSceneObject (query,asI)
- GetMaterial (query,asI)
- GetTexture (query,asI)
- GetAnyLookLastModified ()
- GetTexturesLastModified ()
- GetMaterialsLastModified ()
- GetObjectsLastModified ()
- GetMovementLastModified ()
- SetTexturesAsModified ()
- SetMaterialsAsModified ()
- SetObjectsAsModified ()
- SetMovementAsModified ()
- SetCamera (newCamera)

TypeFile (sourceFilePath)
- IsLoaded ()
- IsFailed ()
- IsStillLoading ()
- GetFilePath ()
- GetDataAsText ()
- GetDataAsArray ()

CURRENT METHODS BREAKDOWN FOR EACH OBJECT

TypeImage (sourceFilePath)
- IsLoaded ()
- IsFailed ()
- IsStillLoading ()
- GetFileName ()
- GetFullPath ()
- GetPath ()
- GetImageObj ()
- GetWidth ()
- GetHeight ()
- GetAspectRatio ()
- GetLastModified ()
- GetLoadHold ()
- SetLoadHold ()
- SetPath ()

TypeOBJFileLoader (sourceFilePath)
- GetObjectCount ()
- GetObject ()
- GetMaterial ()
- IsLoaded ()
- IsFailed ()
- IsStillLoading ()
- TransferObjects (targetScene)

OBEJCT PUBLIC METHODS (from Algorithms.js)

TypeNode (newData)
- DeleteEdges ()
- PushEdge (newEdge)
- PopEdge ()
- GetEdge (idx)
- GetEdgeWeight (idx)
- GetData ()
- GetAuxVar ()
- GetEdgeCount ()
- GetCopy ()
- SetEdge (idx,newNode)
- SetEdgeWeight (idx,weight)
- SetData (newData)
- SetAuxVar (something)
- SetEqualTo (otherNode)
- toString ()

TypeEdge (n1,n2,w)
- GetNodeA ()
- GetNodeB ()
- GetWeight ()
- SetNodeA (newNode)
- SetNodeB (newNode)
- SetWeight (w)
- toString ()

TypeLinkedList (sourceList,idx1,idx2,deleteFromSource)
- Length ()
- Clear ()
- Push (item,asData,i,j)
- PushBack (item,asData,i,j)
- PushFront (item,asData,i,j)
- Pop ()
- PopBack ()
- PopFront ()
- Sort ()
- Reverse ()
- Insert (newThing,idx,asData,sourceIdx1,sourceIdx2)
- Delete (startIdx,endIdx,returnDeletedAsList)
- DeleteData (thisData)
- Cut (startIdx,endIdx)
- Paste (otherList,atIdx)
- Move (idx1,idx2,isAfter)
- Get (idx)
- GetBack ()
- GetFront ()
- GetCopy (idx1, idx2)
- GetIndexOf (query,asData)
- toString ()

TypeDelaunayTriangulation (sourceBoundary)
- (unfinished, no methods yet)

TypeHashGrid (subD, maxP, minP)
- Clear ()
- Add (data, worldPos)
- Delete (data, worldPos)
- Move (data, toWpos, fromWpos)
- GetCount (coord, asGridCoord)
- GetGridCoord (worldPos)
- toString ()

TypePriorityQueue (isMax, compareFunction)
- IsEmpty ()
- Length ()
- SetAsMaxQueue ()
- SetAsMinQueue ()
- GetTop ()
- GetItem (idx)
- Rebalance (query, asData)
- Push (data,asData)
- Pop ()
- Sort ()
- toString ()

TypeMazeGenerator (dim)
- SetDimensions (newDim)
- GetWallPattern ()
- Regenerate ()
- toString ()

TypeRedBlackTree (compareFunction)
- Delete (data)
- Insert (data, asData)
- toString ()

OBEJCT PUBLIC METHODS (from CanvasObjects.js)

TypeCanvasWebGLpainter
(scene,canvasIdString,vertexShaderPath,fragmentShaderPath)
- IsLoaded ()
- IsFailed ()
- IsStillLoading ()
- OperateCamera (theMouseState)
- Draw (ignoreChangeFlag)

TypeCanvas2Dpainter (scene,canvasIdString,clearColor)
- IsLoaded ()
- IsFailed ()
- IsStillLoading ()
- GetContext ()
- GetCanvasObj ()
- OperateCamera ()
- Draw (ignoreChangeFlag)