

Multi-Agent Stochastic Simulation framework

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Chapter 1

No-MASS-GUI

Introduction

The No-MASS-GUI is a standalone tool that enable the No-MASS framework in building energy performance simulation tools such as EnergyPlus. For more details about the No-MASS framework (models of occupant interaction and appliance usage) refer to the No-MASS framework documentation.

The No-MASS framework relies on the fractional radiation transmitted through windows considering the proportion that shading devices are closed to enable interaction with shading devices. EnergyPlus source code has been altered to allow the No-MASS access this estimate at each timestep during the co-simulation using the standard Functional Mock-Up Interface (FMI).

The modified source code has to be compiled to generate an executable version of EnergyPlus for the platform where building simulations are run. The process to build EnergyPlus on all platforms can be found at <https://github.com/NREL/EnergyPlus/wiki/BuildingEnergyPlus>. However, EnergyPlus does not support FMI on Mac OS.

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- [Compiling EnergyPlus](#)
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Chapter 2

Compiling EnergyPlus

This chapter describes how to modify the EnergyPlus source code to allow shading interactions and the compilation process on Linux and Windows platforms. The compilation process is based on the Building EnergyPlus guide at <https://github.com/NREL/EnergyPlus/wiki/BuildingEnergyPlus>.

Download source code

The source code can be download from the GitHub repository at <https://energyplus.net/downloads>. For example purpose, this guide is based on EnergyPlus version 8.6.0.

EnergyPlus Source Code Changes

Alter the source code to allow shading interactions.

DataSurfaces.hh

```
--- ../EnergyPlus-8.6.0/src/EnergyPlus/DataSurfaces.hh
+++ ../EnergyPlus-8.6.0/src/EnergyPlus/DataSurfaces.hh
@@ -938,7 +938,12 @@
    //          triggered on later to control daylight glare
    bool ShadingFlagEMSON; // EMS control flag, true if EMS is controlling ShadingFlag with
    ShadingFlagEMSValue
    int ShadingFlagEMSValue; // EMS control value for Shading Flag
-
+
+    /* No-MASS new lines begin */
+    bool ShadingFractionEMSON; // EMS control flag, true if EMS is controlling ShadingFlag with
    ShadingFlagEMSValue
+    double ShadingFractionEMSValue; // EMS control value for Shading Flag
+    /* No-MASS new lines end */
+
    int StormWinFlag; // -1: Storm window not applicable
    // 0: Window has storm window but it is off
    // 1: Window has storm window and it is on
@@ -1167,6 +1172,8 @@
    ShadingFlag( ShadeOff ),
    ShadingFlagEMSON( false ),
    ShadingFlagEMSValue( 0 ),
+    ShadingFractionEMSON( false ), /* No-MASS new line --- */
+    ShadingFractionEMSValue( 0 ), /* No-MASS new line --- */
    StormWinFlag( -1 ),
    StormWinFlagPrevDay( -1 ),
    FracTimeShadingDeviceOn( 0.0 ),
@@ -1326,6 +1333,361 @@
    SpecTemp( 0.0 ),
    WindowModelType( Window5DetailedModel )
```

```

    {}
+
+   /* No-MASS new lines begin */
+   // Member Constructor
+   SurfaceWindowCalc(
+       int const ShadingFlag, // -1: window has no shading device
+       bool const ShadingFlagEMSON, // EMS control flag, true if EMS is controlling ShadingFlag with
+       ShadingFlagEMSValue
+       int const ShadingFlagEMSValue, // EMS control value for Shading Flag
+       bool const ShadingFractionEMSON, // EMS control flag, true if EMS is controlling ShadingFlag
+       with ShadingFlagEMSValue
+       int const ShadingFractionEMSValue, // EMS control value for Shading Flag
+       int const StormWinFlag, // -1: Storm window not applicable
+       int const StormWinFlagPrevDay, // Previous time step value of StormWinFlag
+       Real64 const FracTimeShadingDeviceOn, // For a single time step, = 0.0 if no shading device or
+       shading device is off,
+       int const ExtIntShadePrevTS, // 1 if exterior or interior blind or shade in place previous time
+       step;
+       int const ShadedConstruction, // For windows with shading, the construction with shading
+       bool const SurfDayLightInit, // surface has been initialized for following 5 arrays
+       Array1< Real64 > const & SolidAngAtRefPt, // Solid angle subtended by window from daylight ref
+       points 1 and 2
+       Array1< Real64 > const & SolidAngAtRefPtWtd, // Solid angle subtended by window from
+       Array2< Real64 > const & IllumFromWinAtRefPt, // Illuminance from window at ref pts for window
+       Array2< Real64 > const & BackLumFromWinAtRefPt, // Window background luminance from window wrt
+       ref pts (cd/m2)
+       Array2< Real64 > const & SourceLumFromWinAtRefPt, // Window luminance at ref pts for window
+       int const DaylFacPoint, // Pointer to daylight factors for the window
+       Real64 const VisTransSelected, // Window vis trans at normal incidence selected for use in
+       daylight calculation
+       Real64 const SwitchingFactor, // Window switching factor (0.0 = unswitched; 1.0 = fully
+       switched)
+       Array1< Real64 > const & WinCenter, // X,Y,Z coordinates of window center point in building
+       coord system
+       Real64 const Theta, // Azimuth of window normal (rad)
+       Real64 const Phi, // Altitude of window normal (rad)
+       Real64 const RhoCeilingWall, // Average interior reflectance seen by light moving up across
+       horizontal
+       Real64 const RhoFloorWall, // Same as above, but for light moving down
+       Real64 const FractionUpgoing, // Fraction light entering window that goes upward
+       Real64 const VisTransRatio, // For windows with switchable glazing, ratio of normal
+       transmittance
+       Array1< Real64 > const & ThetaFace, // Face temperatures of window layers (K)
+       Real64 const IRfromParentZone, // Incident IR from parent zone (W/m2)
+       int const IRErrCount, // For recurring error counts
+       int const IRErrCountC, // For recurring error counts (continuation)
+       Real64 const FrameArea, // Frame projected area (m2)
+       Real64 const FrameConductance, // Frame conductance [no air films] (W/m2-K)
+       Real64 const FrameSolAbsorp, // Frame solar absorptance (assumed same inside and outside)
+       Real64 const FrameVisAbsorp, // Frame visible absorptance (assumed same inside and outside)
+       Real64 const FrameEmis, // Frame thermal emissivity (thermal absorptance) (assumed same
+       Real64 const FrameAreaXEmiss, // Frame area times thermal emissivity (m2)
+       Real64 const FrameRadExchangeFactor, // Frame IR radiant exchange factor
+       Real64 const FrameHRadLinIn, // Frame linearized inside IR radiation conductance (W/m2-K)
+       Real64 const FrameRadThermalFluxRec, // Frame inside IR flux received (W/m2)
+       Real64 const FrameRadThermalFluxRecOld, // Previous value of frame inside IR flux received
+       (W/m2)
+       Real64 const FrEdgeToCenterGlCondRatio, // Ratio of frame edge of glass conductance (without
+       air films) to
+       Real64 const FrameEdgeArea, // Area of glass near frame (m2)
+       Real64 const FrameTempSurfIn, // Frame inside surface temperature (C)
+       Real64 const FrameTempSurfInOld, // Previous value of frame inside surface temperature (C)
+       Real64 const FrameTempSurfOut, // Frame outside surface temperature (C)
+       Real64 const FrameQRadInAbs, // Radiation absorbed by inside of frame (short-wave from solar
+       Real64 const FrameQRadOutAbs, // Radiation absorbed by outside of frame (solar) (W/m2)
+       Real64 const ProjCorrFrOut, // Correction factor to absorbed radiation due to frame outside
+       projection
+       Real64 const ProjCorrFrIn, // Correction factor to absorbed radiation due to frame inside
+       projection
+       int const DividerType, // Divider type (1=DividedLite, 2=Suspended (between-pane))
+       Real64 const DividerArea, // Divider projected area (m2)
+       Real64 const DividerConductance, // Divider conductance [no air films] (W/m2-K)
+       Real64 const DividerSolAbsorp, // Divider solar absorptance (assumed same inside and outside)
+       Real64 const DividerVisAbsorp, // Divider visible absorptance (assumed same inside and outside)
+       Real64 const DividerEmis, // Divider thermal emissivity (thermal absorptance) (assumed same
+       Real64 const DividerAreaXEmiss, // Divider area times thermal emissivity (m2)
+       Real64 const DividerRadExchangeFactor, // Divider IR radiant exchange factor
+       Real64 const DividerHRadLinIn, // Divider linearized inside IR radiation conductance (W/m2-K)
+       Real64 const DividerRadThermalFluxRec, // Divider inside IR flux received (W/m2)
+       Real64 const DividerRadThermalFluxRecOld, // Previous value of divider inside IR flux received
+       (W/m2)
+       Real64 const DivEdgeToCenterGlCondRatio, // Ratio of divider edge of glass conductance (without
+       air films) to
+       Real64 const DividerEdgeArea, // Area of glass near dividers (m2)
+       Real64 const DividerTempSurfIn, // Divider inside surface temperature (C)
+       Real64 const DividerTempSurfInOld, // Previous value of divider inside surface temperature (C)
+       Real64 const DividerTempSurfOut, // Divider outside surface temperature (C)

```

```

+         Real64 const DividerQRadInAbs, // Radiation absorbed by inside of divider (short-wave from
solar
+         Real64 const DividerQRadOutAbs, // Radiation absorbed by outside of divider (solar) (W/m2)
+         Real64 const ProjCorrDivOut, // Correction factor to absorbed radiation due to divider outside
projection
+         Real64 const ProjCorrDivIn, // Correction factor to absorbed radiation due to divider inside
projection
+         Real64 const GlazedFrac, // (Glazed area)/(Glazed area + divider area)
+         Array1< Real64 > const & OutProjSLFracMult, // Multiplier on sunlit fraction due to shadowing
of glass by frame
+         Array1< Real64 > const & InOutProjSLFracMult, // Multiplier on sunlit fraction due to shadowing
of glass by frame
+         Real64 const CenterGIArea, // Center of glass area (m2); area of glass where 1-D conduction
dominates
+         Real64 const EdgeGICorrFac, // Correction factor to center-of-glass conductance to account for
int const OriginalClass, // 0 or if entered originally as:
+         Real64 const ExtBeamAbsByShade, // Exterior beam solar absorbed by window shade (W/m2)
+         Real64 const ExtDiffAbsByShade, // Exterior diffuse solar absorbed by window shade (W/m2)
+         Real64 const IntBeamAbsByShade, // Interior beam solar absorbed by window shade (W/m2)
+         Real64 const IntSWAbsByShade, // Interior diffuse solar plus short-wave from lights absorbed by
window shade (W/m2)
+         Real64 const InitialDifSolAbsByShade, // Initial diffuse solar from ext and int windows
absorbed by window shade (W/m2)
+         Real64 const IntLWAbsByShade, // Interior long-wave from zone lights and equipment absorbed by
window shade (W/m2)
+         Array1< Real64 > const & ShadeAbsFacFace, // Fraction of short-wave radiation incident on face
1 that is
+         Real64 const ConvCoeffWithShade, // Convection coefficient from glass or shade to gap air when
+         Real64 const ConvHeatFlowNatural, // Convective heat flow from gap between glass and interior
shade or blind (W)
+         Real64 const ConvHeatGainToZoneAir, // Convective heat gain to zone air from window gap airflow
(W)
+         Real64 const RetHeatGainToZoneAir, // Convective heat gain to return air sent to zone [W]
+         Real64 const DividerConduction, // Conduction through divider from outside to inside face (W)
+         Real64 const OtherConvHeatGain, // other convective = total conv - standard model prediction
for EQL window model (W)
+         int const BlindNumber, // Blind number for a window with a blind
+         Array1< Real64 > const & EffShBlindEmiss, // Effective emissivity of interior blind or shade
+         Array1< Real64 > const & EffGlassEmiss, // Effective emissivity of glass adjacent to interior
blind or shade
+         Real64 const EffInsSurfTemp, // Effective inside surface temperature for window with interior
blind or
+         bool const MovableSlats, // True if window has a blind with movable slats
+         Real64 const SlatAngThisTS, // Slat angle this time step for window with blind on (radians)
+         Real64 const SlatAngThisTSDeg, // Slat angle this time step for window with blind on (deg)
+         bool const SlatAngThisTSDegEMSon, // flag that indicate EMS system is actuating
SlatAngThisTSDeg
+         Real64 const SlatAngThisTSDegEMSValue, // value that EMS sets for slat angle in degrees
+         bool const SlatsBlockBeam, // True if blind slats block incident beam solar
+         Real64 const BlindAirFlowPermeability, // Blind air-flow permeability for calculation of
convective flow
+         Real64 const TotGlazingThickness, // Total glazing thickness from outside of outer glass to
inside of inner glass (m)
+         Real64 const ProfileAngHor, // Horizontal beam solar profile angle (degrees)
+         Real64 const ProfileAngVert, // Vertical beam solar profile angle (degrees)
+         Real64 const TanProfileAngHor, // Tangent of horizontal profile angle
+         Real64 const TanProfileAngVert, // Tangent of vertical profile angle
+         Real64 const InsideSillDepth, // Depth of inside sill (m)
+         Real64 const InsideReveal, // Depth of inside reveal (m)
+         Real64 const InsideSillSolAbs, // Solar absorptance of inside sill
+         Real64 const InsideRevealSolAbs, // Solar absorptance of inside reveal
+         Real64 const OutsideRevealSolAbs, // Solar absorptance of outside reveal
+         Real64 const BmSolAbsdInsReveal, // Multiplied by BeamSolarRad, gives beam solar absorbed
+         Real64 const BmSolRefldInsReveal, // Multiplied by BeamSolarRad, gives beam solar reflected
+         Real64 const BmSolRefldInsRevealReport, // Beam solar reflected by inside reveal surfaces, for
reporting (W)
+         Real64 const BmSolRefldOutsRevealReport, // Beam solar reflected by outside reveal surfaces,
for reporting (m2)
+         Real64 const BmSolAbsdOutsReveal, // Multiplied by BeamSolarRad, gives beam solar absorbed by
+         Real64 const OutsRevealDiffOntoGlazing, // Multiplied by BeamSolarRad, gives diffuse from beam
reflection from
+         Real64 const InsRevealDiffOntoGlazing, // Multiplied by BeamSolarRad, gives diffuse from beam
reflection
+         Real64 const InsRevealDiffIntoZone, // Multiplied by BeamSolarRad, gives diffuse from beam
reflection
+         Real64 const OutsRevealDiffOntoFrame, // Multiplied by BeamSolarRad, gives diffuse from beam
reflection from outside reveal
+         Real64 const InsRevealDiffOntoFrame, // Multiplied by BeamSolarRad, gives diffuse from beam
reflection from inside reveal
+         Real64 const InsRevealDiffOntoGlazingReport, // Diffuse solar from beam reflection
+         Real64 const InsRevealDiffIntoZoneReport, // Diffuse from beam reflection
+         Real64 const InsRevealDiffOntoFrameReport, // Diffuse from beam reflection from inside reveal
+         Real64 const BmSolAbsdInsRevealReport, // Beam solar absorbed by inside reveal (W)
+         Real64 const BlTsolBmBm, // Time-step value of blind beam-beam solar transmittance (-)
+         Real64 const BlTsolBmDif, // Time-step value of blind beam-diffuse solar transmittance (-)
+         Real64 const BlTsolDifDif, // Time-step value of blind diffuse-diffuse solar transmittance (-)
+         Real64 const BlGlsysTsolBmBm, // Time-step value of blind/glass system beam-beam solar

```

```

transmittance (-)
+   Real64 const B1GlSysTsoldifDif, // Time-step value of blind/glass system diffuse-diffuse solar
transmittance (-)
+   int const ScreenNumber, // Screen number for a window with a screen (do not confuse with
material number)
+   Real64 const ScTsoltBmBm, // Time-step value of screen beam-beam solar transmittance (-)
+   Real64 const ScTsoltBmDif, // Time-step value of screen beam-diffuse solar transmittance (-)
+   Real64 const ScTsoldifDif, // Time-step value of screen diffuse-diffuse solar transmittance (-)
+   Real64 const ScGlSysTsoltBmBm, // Time-step value of screen/glass system beam-beam solar
transmittance (-)
+   Real64 const ScGlSysTsoldifDif, // Time-step value of screen/glass system diffuse-diffuse solar
transmittance (-)
+   Real64 const GlTsoltBmBm, // Time-step value of glass beam-beam solar transmittance (-)
+   Real64 const GlTsoltBmDif, // Time-step value of glass beam-diffuse solar transmittance (-)
+   Real64 const GlTsoldifDif, // Time-step value of glass diffuse-diffuse solar transmittance (-)
+   int const AirflowSource, // Source of gap airflow (INSIDEAIR, OUTSIDEAIR, etc.)
+   int const AirflowDestination, // Destination of gap airflow (INSIDEAIR, OUTSIDEAIR, etc.)
+   Real64 const MaxAirflow, // Maximum gap airflow (m3/s per m of glazing width)
+   int const AirflowControlType, // Gap airflow control type (ALWAYSONATMAXFLOW, etc.)
+   bool const AirflowHasSchedule, // True if gap airflow is scheduled
+   int const AirflowSchedulePtr, // Gap airflow schedule pointer
+   Real64 const AirflowThisTS, // Gap airflow this timestep (m3/s per m of glazing width)
+   Real64 const TAirflowGapOutlet, // Temperature of air leaving airflow gap between glass panes
(C)
+   int const WindowCalcIterationsRep, // Number of iterations in window heat balance calculation
+   Real64 const BmSolTransThruIntWinRep, // Beam solar transmitted through interior window [W]
+   Real64 const VentingOpenFactorRep, // Window/door venting open factor, for reporting
+   Real64 const VentingOpenFactorMultRep, // Window/door opening modulation multiplier on venting
open factor, for reporting
+   Real64 const InsideTempForVentingRep, // Inside air temp used to control window/door venting,
for reporting (C)
+   Real64 const VentingAvailabilityRep, // Venting availability schedule value (0.0/1.0 = no
venting allowed/not allowed)
+   Real64 const IllumFromWinAtRefPt1Rep, // Illuminance from window at reference point #1 [lux]
+   Real64 const IllumFromWinAtRefPt2Rep, // Illuminance from window at reference point #2 [lux]
+   Real64 const LumWinFromRefPt1Rep, // Window luminance as viewed from reference point #1 [cd/m2]
+   Real64 const LumWinFromRefPt2Rep, // Window luminance as viewed from reference point #2 [cd/m2]
+   Real64 const SkySolarInc, // Incident diffuse solar from sky; if CalcSolRefl is true, includes
+   Real64 const GndSolarInc, // Incident diffuse solar from ground; if CalcSolRefl is true,
accounts
+   Real64 const SkyGndSolarInc, // Incident diffuse solar from ground-reflected sky radiation;
used for
+   Real64 const BmGndSolarInc, // Incident diffuse solar from ground-reflected beam radiation;
used for
+   Array1< Real64 > const & ZoneAreaMinusThisSurf, // Zone inside surface area minus this surface
and its subsurfaces
+   Array1< Real64 > const & ZoneAreaReflProdMinusThisSurf, // Zone product of inside surface area
times vis reflectance
+   Real64 const LightWellEff, // Light well efficiency (multiplier on exterior window vis trans
+   bool const SolarDiffusing, // True if exterior window with a construction that contains a
+   Real64 const BmSolReflInsRevealRepEnergy, // energy of BmSolReflInsRevealReport [J]
+   Real64 const BmSolReflOutsRevealRepEnergy, // energy of BmSolReflOutsRevealReport [J]
+   Real64 const BmSolTransThruIntWinRepEnergy, // energy of BmSolTransThruIntWinRep [J]
+   Real64 const FrameHeatGain,
+   Real64 const DividerHeatGain,
+   Real64 const FrameHeatLoss,
+   Real64 const DividerHeatLoss,
+   Real64 const TCLayerTemp, // The temperature of the thermochromic layer of the window
+   Real64 const SpecTemp, // The specification temperature of the TC layer glass
+   int const WindowModelType, // if set to WindowBSDFModel, then uses BSDF methods
+   BSDFWindowDescript const & ComplexFen // Data for complex fenestration, see DataBSDFWindow.cc
for declaration
+   ) :
+   ShadingFlag( ShadingFlag ),
+   ShadingFlagEMSON( ShadingFlagEMSON ),
+   ShadingFlagEMSValue( ShadingFlagEMSValue ),
+   ShadingFractionEMSON( ShadingFractionEMSON ),
+   ShadingFractionEMSValue( ShadingFractionEMSValue ),
+   StormWinFlag( StormWinFlag ),
+   StormWinFlagPrevDay( StormWinFlagPrevDay ),
+   FracTimeShadingDeviceOn( FracTimeShadingDeviceOn ),
+   ExtIntShadePrevTS( ExtIntShadePrevTS ),
+   ShadedConstruction( ShadedConstruction ),
+   SurfDayLightInit( SurfDayLightInit ),
+   SolidAngAtRefPt( SolidAngAtRefPt ),
+   SolidAngAtRefPtWtd( SolidAngAtRefPtWtd ),
+   IllumFromWinAtRefPt( IllumFromWinAtRefPt ),
+   BackLumFromWinAtRefPt( BackLumFromWinAtRefPt ),
+   SourceLumFromWinAtRefPt( SourceLumFromWinAtRefPt ),
+   DaylFacPoint( DaylFacPoint ),
+   VisTransSelected( VisTransSelected ),
+   SwitchingFactor( SwitchingFactor ),
+   WinCenter( 3, WinCenter ),
+   Theta( Theta ),
+   Phi( Phi ),
+   RhoCeilingWall( RhoCeilingWall ),
+   RhoFloorWall( RhoFloorWall ),

```

```

+ FractionUpgoing( FractionUpgoing ),
+ VisTransRatio( VisTransRatio ),
+ ThetaFace( 10, ThetaFace ),
+ IRfromParentZone( IRfromParentZone ),
+ IRErrCount( IRErrCount ),
+ IRErrCountC( IRErrCountC ),
+ FrameArea( FrameArea ),
+ FrameConductance( FrameConductance ),
+ FrameSolAbsorp( FrameSolAbsorp ),
+ FrameVisAbsorp( FrameVisAbsorp ),
+ FrameEmis( FrameEmis ),
+ FrameAreaXEmiss( FrameAreaXEmiss ),
+ FrameRadExchangeFactor( FrameRadExchangeFactor ),
+ FrameHRadLinIn( FrameHRadLinIn ),
+ FrameRadThermalFluxRec( FrameRadThermalFluxRec ),
+ FrameRadThermalFluxRecOld( FrameRadThermalFluxRecOld ),
+ FrEdgeToCenterGlCondRatio( FrEdgeToCenterGlCondRatio ),
+ FrameEdgeArea( FrameEdgeArea ),
+ FrameTempSurfIn( FrameTempSurfIn ),
+ FrameTempSurfInOld( FrameTempSurfInOld ),
+ FrameTempSurfOut( FrameTempSurfOut ),
+ FrameQRadInAbs( FrameQRadInAbs ),
+ FrameQRadOutAbs( FrameQRadOutAbs ),
+ ProjCorrFrOut( ProjCorrFrOut ),
+ ProjCorrFrIn( ProjCorrFrIn ),
+ DividerType( DividerType ),
+ DividerArea( DividerArea ),
+ DividerConductance( DividerConductance ),
+ DividerSolAbsorp( DividerSolAbsorp ),
+ DividerVisAbsorp( DividerVisAbsorp ),
+ DividerEmis( DividerEmis ),
+ DividerAreaXEmiss( DividerAreaXEmiss ),
+ DividerRadExchangeFactor( DividerRadExchangeFactor ),
+ DividerHRadLinIn( DividerHRadLinIn ),
+ DividerRadThermalFluxRec( DividerRadThermalFluxRec ),
+ DividerRadThermalFluxRecOld( DividerRadThermalFluxRecOld ),
+ DivEdgeToCenterGlCondRatio( DivEdgeToCenterGlCondRatio ),
+ DividerEdgeArea( DividerEdgeArea ),
+ DividerTempSurfIn( DividerTempSurfIn ),
+ DividerTempSurfInOld( DividerTempSurfInOld ),
+ DividerTempSurfOut( DividerTempSurfOut ),
+ DividerQRadInAbs( DividerQRadInAbs ),
+ DividerQRadOutAbs( DividerQRadOutAbs ),
+ ProjCorrDivOut( ProjCorrDivOut ),
+ ProjCorrDivIn( ProjCorrDivIn ),
+ GlazedFrac( GlazedFrac ),
+ OutProjSLFracMult( 24, OutProjSLFracMult ),
+ InOutProjSLFracMult( 24, InOutProjSLFracMult ),
+ CenterGIArea( CenterGIArea ),
+ EdgeGlCorrFac( EdgeGlCorrFac ),
+ OriginalClass( OriginalClass ),
+ ExtBeamAbsByShade( ExtBeamAbsByShade ),
+ ExtDiffAbsByShade( ExtDiffAbsByShade ),
+ IntBeamAbsByShade( IntBeamAbsByShade ),
+ IntSWAbsByShade( IntSWAbsByShade ),
+ InitialDifSolAbsByShade( InitialDifSolAbsByShade ),
+ IntLWAbsByShade( IntLWAbsByShade ),
+ ShadeAbsFacFace( 2, ShadeAbsFacFace ),
+ ConvCoeffWithShade( ConvCoeffWithShade ),
+ ConvHeatFlowNatural( ConvHeatFlowNatural ),
+ ConvHeatGainToZoneAir( ConvHeatGainToZoneAir ),
+ RetHeatGainToZoneAir( RetHeatGainToZoneAir ),
+ DividerConduction( DividerConduction ),
+ OtherConvHeatGain( OtherConvHeatGain ),
+ BlindNumber( BlindNumber ),
+ EffShBlindEmiss( MaxSlatAngs, EffShBlindEmiss ),
+ EffGlassEmiss( MaxSlatAngs, EffGlassEmiss ),
+ EffInsSurfTemp( EffInsSurfTemp ),
+ MovableSlats( MovableSlats ),
+ SlatAngThisTS( SlatAngThisTS ),
+ SlatAngThisTSDeg( SlatAngThisTSDeg ),
+ SlatAngThisTSDegEMSon( SlatAngThisTSDegEMSon ),
+ SlatAngThisTSDegEMSValue( SlatAngThisTSDegEMSValue ),
+ SlatsBlockBeam( SlatsBlockBeam ),
+ BlindAirFlowPermeability( BlindAirFlowPermeability ),
+ TotGlazingThickness( TotGlazingThickness ),
+ ProfileAngHor( ProfileAngHor ),
+ ProfileAngVert( ProfileAngVert ),
+ TanProfileAngHor( TanProfileAngHor ),
+ TanProfileAngVert( TanProfileAngVert ),
+ InsideSillDepth( InsideSillDepth ),
+ InsideReveal( InsideReveal ),
+ InsideSillSolAbs( InsideSillSolAbs ),
+ InsideRevealSolAbs( InsideRevealSolAbs ),
+ OutsideRevealSolAbs( OutsideRevealSolAbs ),
+ BmSolAbsdInsReveal( BmSolAbsdInsReveal ),
+ BmSolRefldInsReveal( BmSolRefldInsReveal ),

```

```

+         BmSolRefldInsRevealReport( BmSolRefldInsRevealReport ),
+         BmSolRefldOutsRevealReport( BmSolRefldOutsRevealReport ),
+         BmSolAbsdOutsReveal( BmSolAbsdOutsReveal ),
+         OutsRevealDiffOntoGlazing( OutsRevealDiffOntoGlazing ),
+         InsRevealDiffOntoGlazing( InsRevealDiffOntoGlazing ),
+         InsRevealDiffIntoZone( InsRevealDiffIntoZone ),
+         OutsRevealDiffOntoFrame( OutsRevealDiffOntoFrame ),
+         InsRevealDiffOntoFrame( InsRevealDiffOntoFrame ),
+         InsRevealDiffOntoGlazingReport( InsRevealDiffOntoGlazingReport ),
+         InsRevealDiffIntoZoneReport( InsRevealDiffIntoZoneReport ),
+         InsRevealDiffOntoFrameReport( InsRevealDiffOntoFrameReport ),
+         BmSolAbsdInsRevealReport( BmSolAbsdInsRevealReport ),
+         BlTsolBmBm( BlTsolBmBm ),
+         BlTsolBmDif( BlTsolBmDif ),
+         BlTsolDifDif( BlTsolDifDif ),
+         BlGlSysTsolBmBm( BlGlSysTsolBmBm ),
+         BlGlSysTsolDifDif( BlGlSysTsolDifDif ),
+         ScreenNumber( ScreenNumber ),
+         ScTsolBmBm( ScTsolBmBm ),
+         ScTsolBmDif( ScTsolBmDif ),
+         ScTsolDifDif( ScTsolDifDif ),
+         ScGlSysTsolBmBm( ScGlSysTsolBmBm ),
+         ScGlSysTsolDifDif( ScGlSysTsolDifDif ),
+         GlTsolBmBm( GlTsolBmBm ),
+         GlTsolBmDif( GlTsolBmDif ),
+         GlTsolDifDif( GlTsolDifDif ),
+         AirflowSource( AirflowSource ),
+         AirflowDestination( AirflowDestination ),
+         MaxAirflow( MaxAirflow ),
+         AirflowControlType( AirflowControlType ),
+         AirflowHasSchedule( AirflowHasSchedule ),
+         AirflowSchedulePtr( AirflowSchedulePtr ),
+         AirflowThisTS( AirflowThisTS ),
+         TAirflowGapOutlet( TAirflowGapOutlet ),
+         WindowCalcIterationsRep( WindowCalcIterationsRep ),
+         BmSolTransThruIntWinRep( BmSolTransThruIntWinRep ),
+         VentingOpenFactorRep( VentingOpenFactorRep ),
+         VentingOpenFactorMultRep( VentingOpenFactorMultRep ),
+         InsideTempForVentingRep( InsideTempForVentingRep ),
+         VentingAvailabilityRep( VentingAvailabilityRep ),
+         IllumFromWinAtRefPt1Rep( IllumFromWinAtRefPt1Rep ),
+         IllumFromWinAtRefPt2Rep( IllumFromWinAtRefPt2Rep ),
+         LumWinFromRefPt1Rep( LumWinFromRefPt1Rep ),
+         LumWinFromRefPt2Rep( LumWinFromRefPt2Rep ),
+         SkySolarInc( SkySolarInc ),
+         GndSolarInc( GndSolarInc ),
+         SkyGndSolarInc( SkyGndSolarInc ),
+         BmGndSolarInc( BmGndSolarInc ),
+         ZoneAreaMinusThisSurf( 3, ZoneAreaMinusThisSurf ),
+         ZoneAreaReflProdMinusThisSurf( 3, ZoneAreaReflProdMinusThisSurf ),
+         LightWellEff( LightWellEff ),
+         SolarDiffusing( SolarDiffusing ),
+         BmSolRefldInsRevealRepEnergy( BmSolRefldInsRevealRepEnergy ),
+         BmSolRefldOutsRevealRepEnergy( BmSolRefldOutsRevealRepEnergy ),
+         BmSolTransThruIntWinRepEnergy( BmSolTransThruIntWinRepEnergy ),
+         FrameHeatGain( FrameHeatGain ),
+         DividerHeatGain( DividerHeatGain ),
+         FrameHeatLoss( FrameHeatLoss ),
+         DividerHeatLoss( DividerHeatLoss ),
+         TCLayerTemp( TCLayerTemp ),
+         SpecTemp( SpecTemp ),
+         WindowModelType( WindowModelType ),
+         ComplexFen( ComplexFen )
+     {}
+     /* No-MASS new lines end */

void
InitSolarHeatGains()

```

DaylightingManager.cc

```

--- ../EnergyPlus-8.6.0/src/EnergyPlus/DaylightingManager.cc
+++ ../EnergyPlus-8.6.0/src/EnergyPlus/DaylightingManager.cc
@@ -62,6 +62,7 @@
     #include <cmath>
     #include <string>

+#include <fstream> // added by jake /* No-MASS new line --- */
// ObjexxFCL Headers
#include <ObjexxFCL/Array.functions.hh>
#include <ObjexxFCL/Fmath.hh>
@@ -5931,6 +5932,11 @@
     VTRatio = VTNow / VTMaster;

```



```

    }
}

+
+ // jake /* No-MASS new lines begin */
+ if (SurfaceWindow(IWin).ShadingFractionEMSON){
+     VTRatio = VTRatio * SurfaceWindow(IWin).ShadingFractionEMSValue;
+ } /* No-MASS new lines end */

// Loop over reference points
for ( IL = 1; IL <= NREFPT; ++IL ) {

```

EMSManager.cc

```

--- ../EnergyPlus-8.6.0/src/EnergyPlus/EMSManager.cc
+++ ../EnergyPlus-8.6.0/src/EnergyPlus/EMSManager.cc
@@ -1859,7 +1859,9 @@
     if ( Surface( loopSurfNum ).WindowShadingControlPtr == 0 ) continue;

     SetupEMSActuator( "Window Shading Control", Surface( loopSurfNum ).Name, "Control Status",
"ShadeStatus", SurfaceWindow( loopSurfNum ).ShadingFlagEMSON, SurfaceWindow( loopSurfNum ).ShadingFlagEMSValue
);

-
+
+     SetupEMSActuator( "Window Shading Fraction", Surface( loopSurfNum ).Name, "Control Fraction",
"ShadeFraction", SurfaceWindow( loopSurfNum ).ShadingFractionEMSON, SurfaceWindow( loopSurfNum
).ShadingFractionEMSValue ); /* No-MASS new line --- */

+
     if ( SurfaceWindow( loopSurfNum ).MovableSlats ) {
         SetupEMSActuator( "Window Shading Control", Surface( loopSurfNum ).Name, "Slat Angle",
"degrees", SurfaceWindow( loopSurfNum ).SlatAngThisTSDegEMSON, SurfaceWindow( loopSurfNum
).SlatAngThisTSDegEMSValue );

```

SolarShading.cc

```

--- ../EnergyPlus-8.6.0/src/EnergyPlus/SolarShading.cc
+++ ../EnergyPlus-8.6.0/src/EnergyPlus/SolarShading.cc
@@ -954,6 +954,19 @@
    }

    DisplayString( "Initializing Surface (Shading) Report Variables" );

+
+ //jake /* No-MASS new lines begin */
+ for ( SurfLoop = 1; SurfLoop <= TotSurfaces; ++SurfLoop ) {
+     if ( Surface( SurfLoop ).Class == SurfaceClass_Window && Surface( SurfLoop
).WindowShadingControlPtr > 0 ) {
+         int WinShadeCtrlNum = Surface( SurfLoop ).WindowShadingControlPtr;
+         if ( WindowShadingControl( WinShadeCtrlNum ).ShadingType == WSC_ST_InteriorShade ||
WindowShadingControl( WinShadeCtrlNum ).ShadingType == WSC_ST_ExteriorShade || WindowShadingControl(
WinShadeCtrlNum ).ShadingType == WSC_ST_BetweenGlassShade ) {
+             // CurrentModuleObject='Surfaces'
+             SetupOutputVariable( "Window Shading Fraction [Fraction]", SurfaceWindow( SurfLoop
).ShadingFractionEMSValue, "Zone", "Average", Surface( SurfLoop ).Name );
+         }
+     }
+ }
+ //jake /* No-MASS new lines end */
+
+ // CurrentModuleObject='Surfaces'
+ for ( SurfLoop = 1; SurfLoop <= TotSurfaces; ++SurfLoop ) {
+     if ( Surface( SurfLoop ).ExtSolar ) {
@@ -5295,6 +5308,15 @@
        CosInc = CosIncAng( TimeStep, HourOfDay, SurfNum2 );
        SunLitFrac = SunlitFrac( TimeStep, HourOfDay, SurfNum2 );

+
+ //! jake - set trans to shading fraction /* No-MASS new lines begin */
+ //! EMS Actuator Point: override setting if ems flag on
+ if (SurfaceWindow(SurfNum).ShadingFractionEMSON){
+     SunLitFrac = SunLitFrac - ( 1 - SurfaceWindow(SurfNum).ShadingFractionEMSValue);
+     if(SunLitFrac < 0.0){
+         SunLitFrac = 0.0;
+     }
+ } /* No-MASS new lines end */
+
+ //-----
+ // EXTERIOR BEAM SOLAR RADIATION ABSORBED ON THE OUTSIDE OF OPAQUE SURFACES
+ //-----
@@ -9652,6 +9674,78 @@
    }
}

```

```

+  /* No-MASS new lines begin */
+  void
+  ComputeWinShadeAbsorpFactorsFor(int SurfNum)
+  {
+
+      // SUBROUTINE INFORMATION:
+      //   AUTHOR      Fred Winkelmann
+      //   DATE WRITTEN  Mar 2001
+      //   MODIFIED     Oct 2002,FCW: change ConstrNumSh =
+      WindowShadingControl(WinShadeCtrlNum)%ShadedConstruction
+      //   to Surface(SurfNum)%ShadedConstruction
+      //   RE-ENGINEERED na
+
+      // PURPOSE OF THIS SUBROUTINE:
+      // Called by InitSolarCalculations. Finds fractions that apportion radiation absorbed by a
+      // window shade to the two faces of the shade. For radiation incident from the left,
+      // ShadeAbsFacFace(1) is the fraction of radiation absorbed in the left-hand half of the
+      // of the shade and ShadeAbsFacFace(2) is the fraction absorbed in the right-hand half.
+      // The shade is assumed to be homogeneous.
+
+      // REFERENCES: See EnergyPlus engineering documentation
+      // USE STATEMENTS: na
+
+      // Locals
+      // SUBROUTINE PARAMETER DEFINITIONS: na
+      // INTERFACE BLOCK SPECIFICATIONS: na
+      // DERIVED TYPE DEFINITIONS: na
+
+      // SUBROUTINE LOCAL VARIABLE DECLARATIONS:
+
+      int WinShadeCtrlNum; // Window shading control number
+
+      int ConstrNumSh; // Window construction number with shade
+      int TotLay; // Total layers in a construction
+      int MatNumSh; // Shade layer material number
+      Real64 AbsorpEff; // Effective absorptance of isolated shade layer (fraction of
+      // of incident radiation remaining after reflected portion is
+      // removed that is absorbed
+
+      if ( Surface( SurfNum ).Class == SurfaceClass_Window && Surface( SurfNum ).WindowShadingControlPtr
+      > 0 ) {
+          WinShadeCtrlNum = Surface( SurfNum ).WindowShadingControlPtr;
+          if ( WindowShadingControl( WinShadeCtrlNum ).ShadingType == WSC_ST_InteriorShade ||
+          WindowShadingControl( WinShadeCtrlNum ).ShadingType == WSC_ST_ExteriorShade || WindowShadingControl( WinShadeCtrlNum
+          ).ShadingType == WSC_ST_BetweenGlassShade ) {
+              ConstrNumSh = Surface( SurfNum ).ShadedConstruction;
+              TotLay = Construct( ConstrNumSh ).TotLayers;
+              if ( WindowShadingControl( WinShadeCtrlNum ).ShadingType == WSC_ST_InteriorShade ) {
+                  MatNumSh = Construct( ConstrNumSh ).LayerPoint( TotLay ); // Interior shade
+              } else if ( WindowShadingControl( WinShadeCtrlNum ).ShadingType == WSC_ST_ExteriorShade ) {
+                  MatNumSh = Construct( ConstrNumSh ).LayerPoint( 1 ); // Exterior shade
+              } else if ( WindowShadingControl( WinShadeCtrlNum ).ShadingType == WSC_ST_BetweenGlassShade
+              ) {
+                  if ( Construct( ConstrNumSh ).TotGlassLayers == 2 ) {
+                      MatNumSh = Construct( ConstrNumSh ).LayerPoint( 3 ); // Double pane with
+                      between-glass shade
+                  } else {
+                      MatNumSh = Construct( ConstrNumSh ).LayerPoint( 5 ); // Triple pane with
+                      between-glass shade
+                  }
+              }
+              ///! jake - set trans to shading fraction
+              ///! EMS Actuator Point: override setting if ems flag on
+              if ( SurfaceWindow( SurfNum ).ShadingFractionEMSON ) {
+                  Material( MatNumSh ).Trans = SurfaceWindow( SurfNum ).ShadingFractionEMSValue;
+              }
+
+              AbsorpEff = Material( MatNumSh ).AbsorpSolar / ( Material( MatNumSh ).AbsorpSolar +
+              Material( MatNumSh ).Trans + 0.0001 );
+              AbsorpEff = min( max( AbsorpEff, 0.0001 ), 0.999 ); // Constrain to avoid problems with
+              following log eval
+              SurfaceWindow( SurfNum ).ShadeAbsFacFace( 1 ) = ( 1.0 - std::exp( 0.5 * std::log( 1.0 -
+              AbsorpEff ) ) ) / AbsorpEff;
+              SurfaceWindow( SurfNum ).ShadeAbsFacFace( 2 ) = 1.0 - SurfaceWindow( SurfNum
+              ).ShadeAbsFacFace( 1 );
+              //std::cout << "1: " << std::to_string(SurfaceWindow( SurfNum ).ShadeAbsFacFace( 1 )) <<
+              "" << std::endl;
+              //std::cout << "2: " << std::to_string(SurfaceWindow( SurfNum ).ShadeAbsFacFace( 2 )) <<
+              "" << std::endl;
+
+          }
+      }
+
+  } /* No-MASS new lines end */
+
+  void

```

```
CalcWinTransDifSolInitialDistribution()
{
```

SolarShading.hh

```
--- ../EnergyPlus-8.6.0/src/EnergyPlus/SolarShading.hh
+++ ../EnergyPlus-8.6.0/src/EnergyPlus/SolarShading.hh
@@ -476,7 +476,11 @@
```

```
    void
    ComputeWinShadeAbsorpFactors();
-
+ /* No-MASS new lines begin */
+ void
+ ComputeWinShadeAbsorpFactorsFor(int SurfNum);
+ /* No-MASS new lines end */
+
    void
    CalcWinTransDifSolInitialDistribution();
```

WindowManager.cc

```
--- ../EnergyPlus-8.6.0/src/EnergyPlus/WindowManager.cc
+++ ../EnergyPlus-8.6.0/src/EnergyPlus/WindowManager.cc
@@ -3040,10 +3040,30 @@
```

```
    if ( ShadeFlag == IntShadeOn || ShadeFlag == ExtShadeOn || ShadeFlag == IntBlindOn || ShadeFlag ==
    ExtBlindOn || ShadeFlag == BGShadeOn || ShadeFlag == BGBlindOn || ShadeFlag == ExtScreenOn ) {
        nglfacep = nglface + 2;
+
+        /* No-MASS new lines begin */
+        //ShadeAbsFac1 = SurfaceWindow( SurfNum ).ShadeAbsFacFace( 1 );
+        //ShadeAbsFac2 = SurfaceWindow( SurfNum ).ShadeAbsFacFace( 2 );
+        //jake
+        //DisplayString( "abl: " + std::to_string(ShadeAbsFac1) + " :");
+        //DisplayString( "abl: " + std::to_string(ShadeAbsFac2) + " :");
+
+        EnergyPlus::SolarShading::ComputeWinShadeAbsorpFactorsFor(SurfNum);
+
+        ShadeAbsFac1 = SurfaceWindow( SurfNum ).ShadeAbsFacFace( 1 );
+        ShadeAbsFac2 = SurfaceWindow( SurfNum ).ShadeAbsFacFace( 2 );
+
+        //DisplayString( "bb1: " + std::to_string(ShadeAbsFac1) + " :");
+        //DisplayString( "bb1: " + std::to_string(ShadeAbsFac2) + " :");
+
+        AbsRadShadeFace( 1 ) = ( SurfaceWindow( SurfNum ).ExtBeamAbsByShade + SurfaceWindow( SurfNum
        ).ExtDiffAbsByShade ) * ShadeAbsFac1 + ( SurfaceWindow( SurfNum ).IntBeamAbsByShade + SurfaceWindow( SurfNum
        ).IntSWAbsByShade ) * ShadeAbsFac2;
+        AbsRadShadeFace( 2 ) = ( SurfaceWindow( SurfNum ).ExtBeamAbsByShade + SurfaceWindow( SurfNum
        ).ExtDiffAbsByShade ) * ShadeAbsFac2 + ( SurfaceWindow( SurfNum ).IntBeamAbsByShade + SurfaceWindow( SurfNum
        ).IntSWAbsByShade ) * ShadeAbsFac1;
+
+        //DisplayString( "cb1: " + std::to_string(AbsRadShadeFace( 1 )) + " :");
+        //DisplayString( "cb1: " + std::to_string(AbsRadShadeFace( 2 )) + " :");
+        /* No-MASS new lines end */
+
+        if ( ShadeFlag == IntShadeOn || ShadeFlag == IntBlindOn ) AbsRadShadeFace( 2 ) +=
        SurfaceWindow( SurfNum ).IntLWAbsByShade;
+        sconsh = scon( nglayer + 1 );
+        TauShIR = tir( nglface + 1 );
```

Compiling on Linux

The compilation process has to be completed after modification in the source code has been done. These instructions are written around Ubuntu 14.04 LTS, but they might remain valid for most of Linux distributions.

1. Install the g++ compiler with Fortran utilities to compile the code. Fortran utilities are used to process EnergyPlus output files. The g++ compiler can be installed from terminal with the following command.

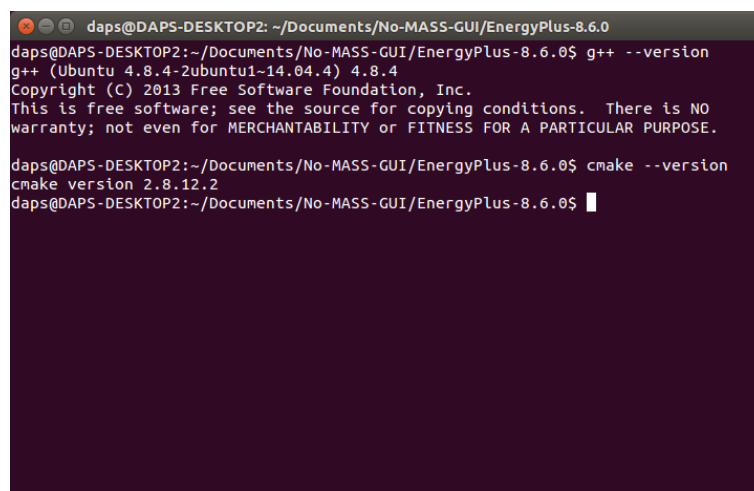
```
sudo apt-get install g++ gfortran
```

2. Install CMake tools. A terminal-based user interface can be installed with the following command.

```
sudo apt-get install cmake cmake-curses-gui
```

Version of installed programmes can be verified with the following commands from a terminal.

```
g++ --version
cmake --version
```



```
daps@dAPS-DESKTOP2: ~/Documents/No-MASS-GUI/EnergyPlus-8.6.0
daps@dAPS-DESKTOP2:~/Documents/No-MASS-GUI/EnergyPlus-8.6.0$ g++ --version
g++ (Ubuntu 4.8.4-2ubuntu1~14.04.4) 4.8.4
Copyright (C) 2013 Free Software Foundation, Inc.
This is free software; see the source for copying conditions. There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

daps@dAPS-DESKTOP2:~/Documents/No-MASS-GUI/EnergyPlus-8.6.0$ cmake --version
cmake version 2.8.12.2
daps@dAPS-DESKTOP2:~/Documents/No-MASS-GUI/EnergyPlus-8.6.0$
```

Figure 2.1 g++ compiler and cmake installed versions

3. Navigate in the terminal to the root of the EnergyPlus source code folder and create the build folder where the code will be compiled.

```
cd /home/daps/Documents/No-MASS-GUI/EnergyPlus-8.6.0
mkdir build
cd build
```

4. Launch CMake from the build location by executing the following command from terminal.

```
cmake ../
```

where `../` refers to the build's parent folder (root folder).

5. Configure the build by pressing **c**, and a list of editable build options will be presented. Set the `CMAKE_BUILD_TYPE` type to "Release" and turn on the `BUILD_FORTTRAN` options at this step. Press **c** again to reconfigure after completing changes, then **g** to generate makefiles and exit.

```

daps@DAPS-DESKTOP2: ~/Documents/No-MASS-GUI/EnergyPlus-8.6.0/build
Page 1 of 1
BUILD_DOCS OFF
BUILD_FORTRAN ON
BUILD_PACKAGE OFF
BUILD_TESTING OFF
BUILD_VALIDATION_REPORTS OFF
CMAKE_BUILD_TYPE Release
CMAKE_INSTALL_PREFIX /usr/local
CMAKE_VERSION_BUILD Unknown
ENABLE_COVERAGE OFF
ENABLE_GTEST_DEBUG_MODE ON
ENABLE_GTEST_SHUFFLE ON
ENABLE_MEMORY_SANITIZER OFF

BUILD_DOCS: Build LaTeX-pdf documentation
Press [enter] to edit option
Press [c] to configure Press [g] to generate and exit
Press [h] for help Press [q] to quit without generating
Press [t] to toggle advanced mode (Currently Off)
CMake Version 2.8.12.2

```

Figure 2.2 Build options

- Finally, run `make -j N`, where `N` is the number of job slots to execute multiple jobs at once. The default number of job slots is one, which means one job at a time. The number of job slots depends on the available hardware resources (CPU cores and memory), and the memory required by each make job.

```

daps@DAPS-DESKTOP2: ~/Documents/No-MASS-GUI/EnergyPlus-8.6.0/build
[ 98%] Building CXX object src/EnergyPlus/CMakeFiles/energypluslib.dir/ZoneContaminantPredictorCorrector.cc.o
[ 99%] Building CXX object src/EnergyPlus/CMakeFiles/energypluslib.dir/ZoneDehumidifier.cc.o
[ 99%] Building CXX object src/EnergyPlus/CMakeFiles/energypluslib.dir/ZoneEquipmentManager.cc.o
[ 99%] Building CXX object src/EnergyPlus/CMakeFiles/energypluslib.dir/ZonePlenum.cc.o
[ 99%] Building CXX object src/EnergyPlus/CMakeFiles/energypluslib.dir/ZoneTemperaturePredictorCorrector.cc.o
Linking CXX static library ../../Products/libenergypluslib.a
[ 99%] Built target energypluslib
Scanning dependencies of target energyplusapi
[ 99%] [100%] Building CXX object src/EnergyPlus/CMakeFiles/energyplusapi.dir/EnergyPlusPgm.cc.o
Building CXX object src/EnergyPlus/CMakeFiles/energyplusapi.dir/CommandLineInterface.cc.o
Linking CXX shared library ../../Products/libenergyplusapi.so
[100%] Built target energyplusapi
Scanning dependencies of target energyplus
[100%] Building CXX object src/EnergyPlus/CMakeFiles/energyplus.dir/main.cc.o
Linking CXX executable ../../Products/energyplus
[100%] Built target energyplus
daps@DAPS-DESKTOP2:~/Documents/No-MASS-GUI/EnergyPlus-8.6.0/build$

```

Figure 2.3 'make -j 2' output

- The compiled EnergyPlus can be found in the `build/Products` folder.

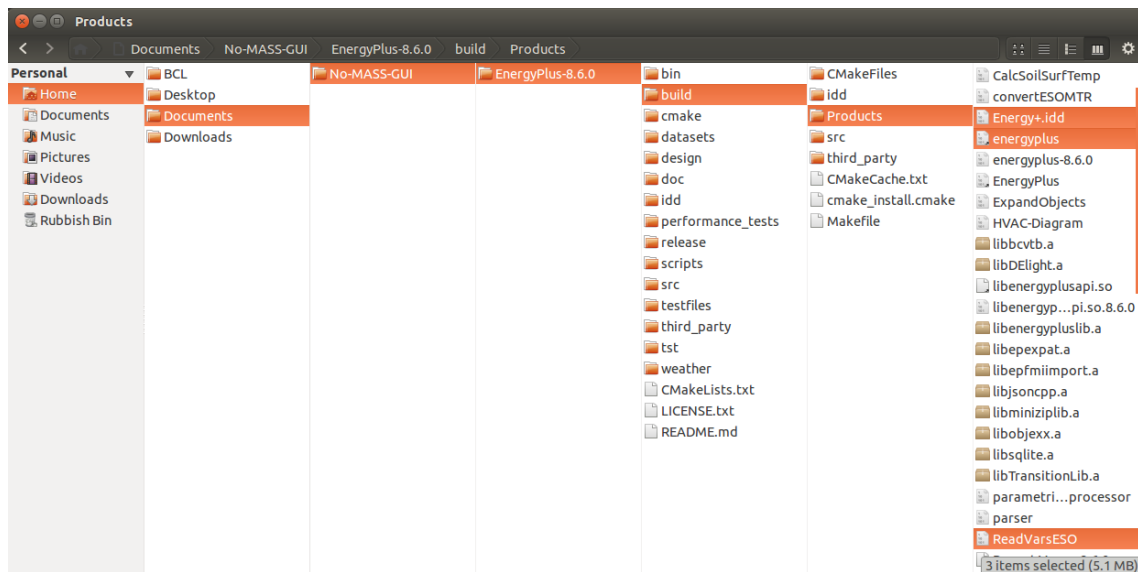


Figure 2.4 EnergyPlus and ReadVarsESO applications folder

Compiling on Windows

The compilation process followed in this guide is based on Visual Studio. The code can also be compiled using GCC, although the process is not included in this guide.

1. Install Visual Studio. Visual Studio Community is distributed by Microsoft and free to use. Select the Desktop development with C++ workload from the main window options and click install.

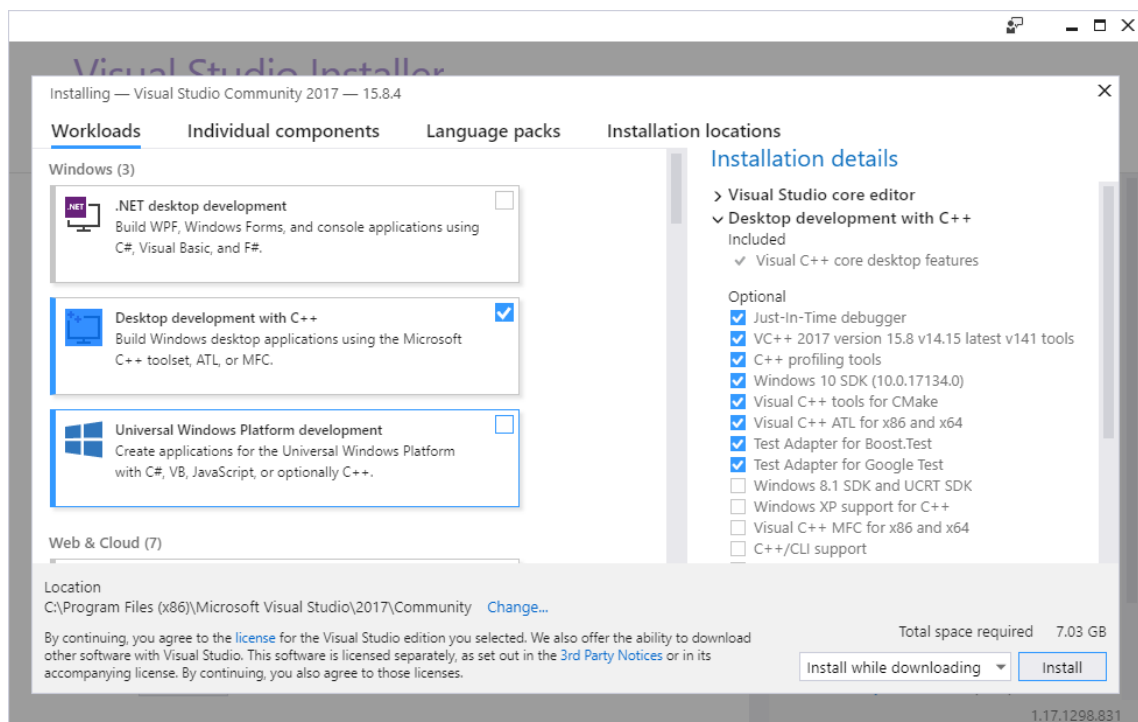


Figure 2.5 Visual Studio Community 2017

2. Install Python 2. It can be downloaded at <https://www.python.org/downloads>
3. Install cmake that includes a graphic user interface (cmake-gui). Cmake can be downloaded at <https://cmake.org/download>.
4. Install MinGW - Minimalist GNU for Windows to support Fortran utilities. MinGW for Windows can be downloaded at <http://mingw-w64.org/doku.php/download>.

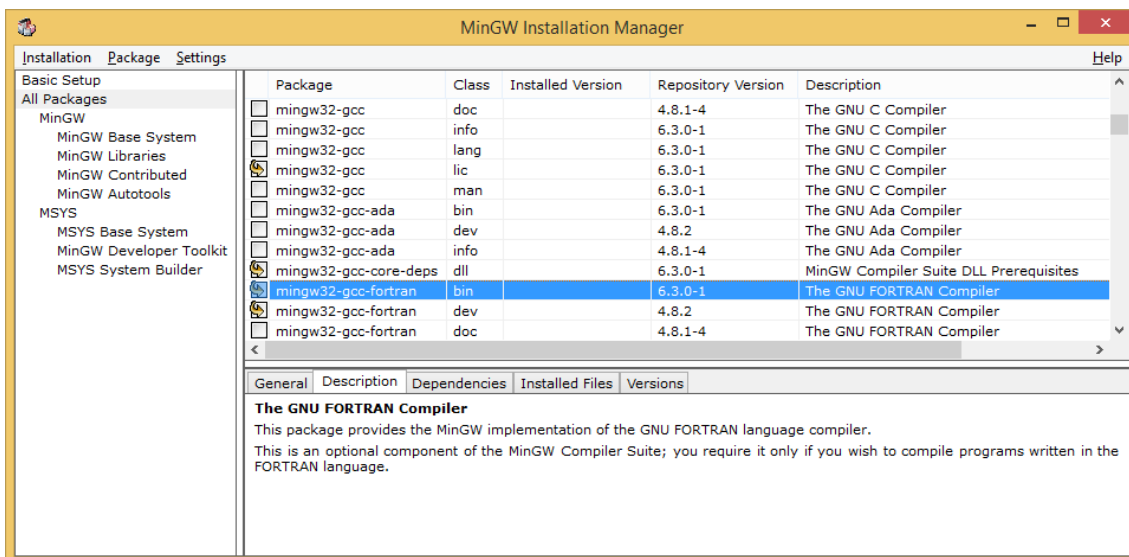


Figure 2.6 MinGW with Fortran support

5. Open CMake (cmake-gui), point the source code to the root folder of the EnergyPlus code and the build folder to the location inside the root folder.

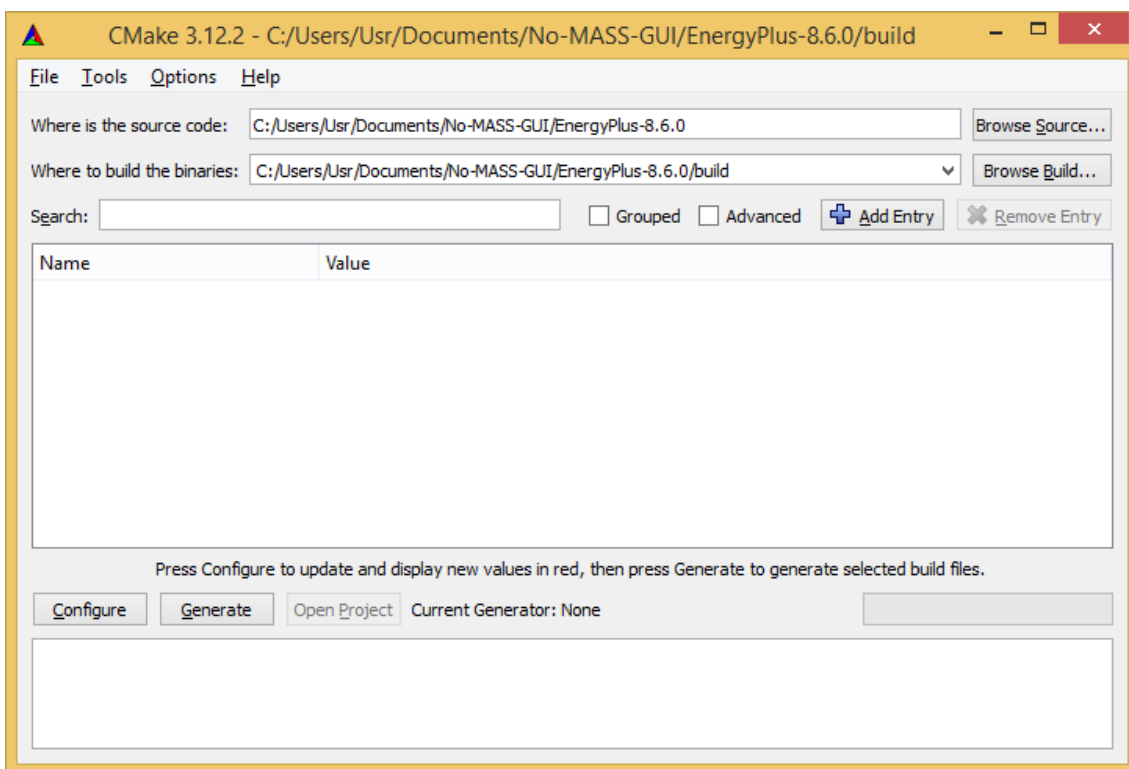


Figure 2.7 CMake-GUI

6. Click **Configure** and choose **Visual Studio 15** or **Visual Studio 15 Win64**.

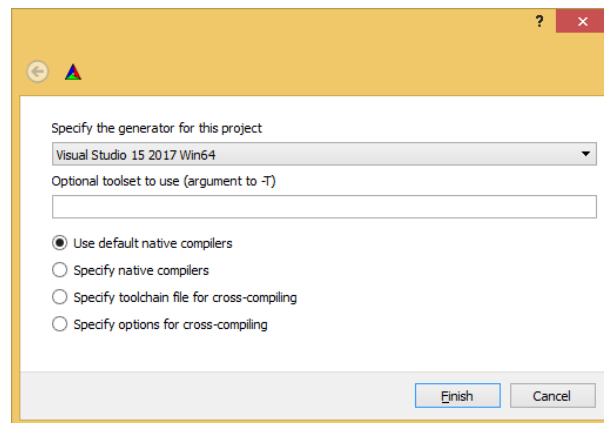


Figure 2.8 CMake-GUI configuration

7. Enable the `BUILD_FORTRAN` option, then click **Generate** to produce a Visual Studio solution.

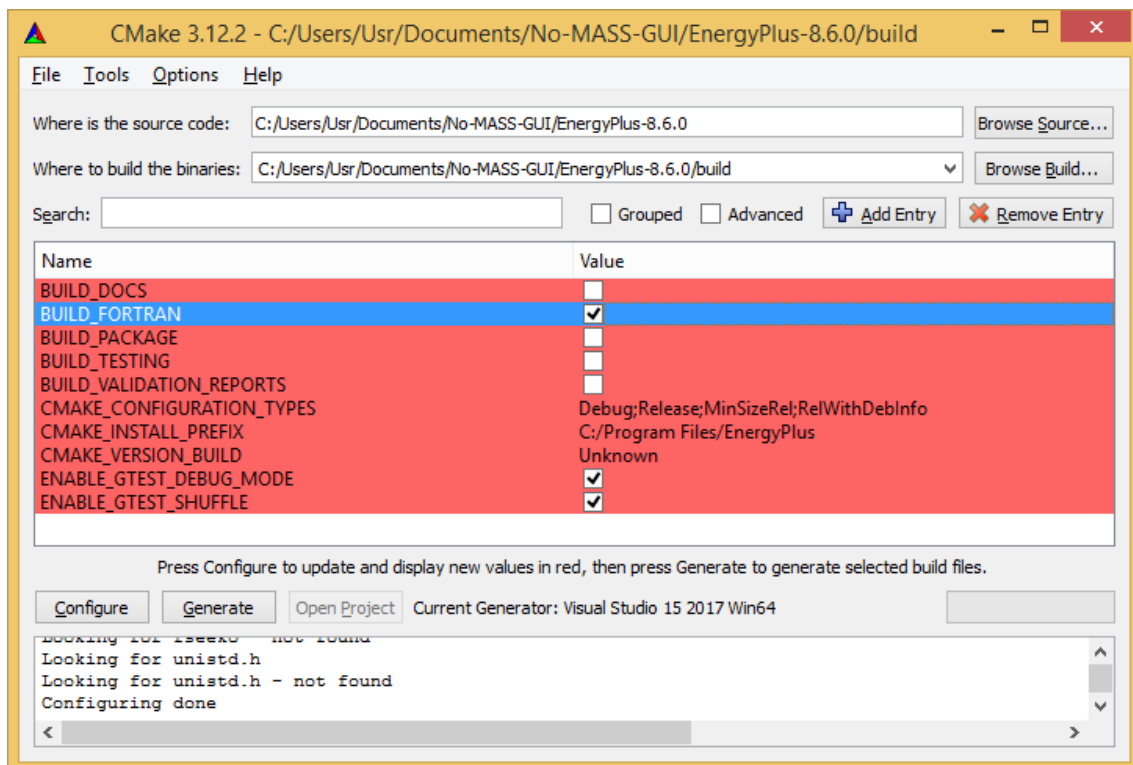


Figure 2.9 CMake-GUI generate Visual Studio solution

8. Open the solution in Visual Studio, select the build type to `Release` and compile the solution from the menu **Build/Build Solution**.

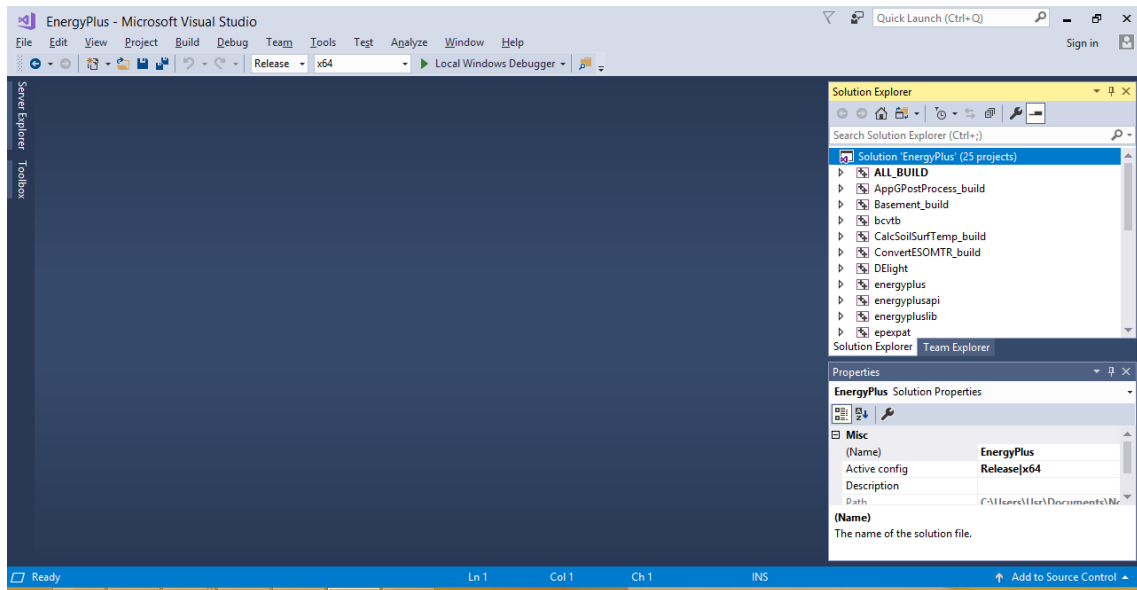


Figure 2.10 Release build compilation

9. The compiled EnergyPlus can be found in the build/Products/Release folder.

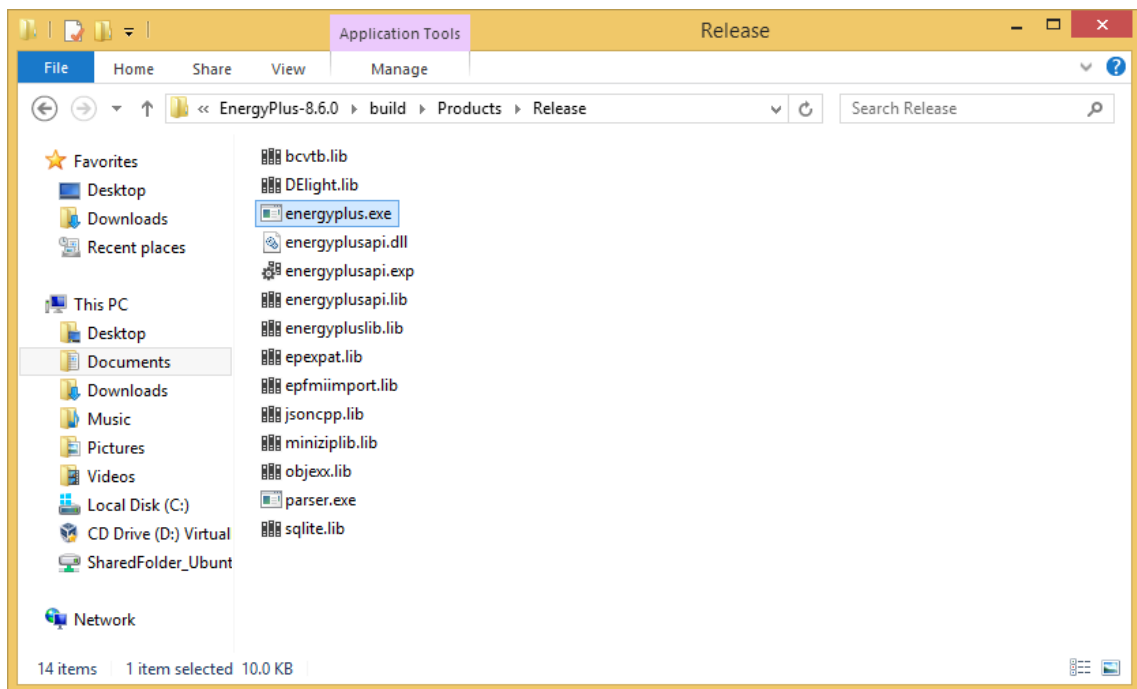


Figure 2.11 EnergyPlus.exe applications folder

10. Finally, copy the Energy+.idd file from Products to Products/Release folder.

Chapter 3

Prerequisites

No-MASS-GUI is an application coded in Python. Therefore, a Python interpreter is required to launch the application. There are multiple Python interpreters for both Linux and Windows operating systems. Anaconda2 is an open source platform that integrates the Python compiler and data science and machine learning libraries. Using Anaconda simplify installation of extra packages required by the No-MASS-GUI application. Anaconda2 (for Python 2.7) has been used to test the No-MASS-GUI, and the installer can be downloaded from <https://www.anaconda.com/download>.

Spyder

Spyder (Scientific Python Development EnviRonment) is a programming environment for Python included in Anaconda installation. The No-MASS-GUI can be edited and launched from Spyder.

Chapter 4

Implementation

This chapter describes the use of the No-MASS-GUI to launch building performance simulations with integration of the No-MASS platform. No-MASS-GUI is coded in Python. Therefore, a Python interpreter is required to launch the application. There are multiple Python interpreters for both Linux and Windows operating systems.

Anaconda2 is an open source platform that integrates Python and data science and machine learning libraries. (for Python 2.7)

Configuration

Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

Simulation

Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

Building

Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

Zones

Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

Agents

Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

MASS-Models

Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

Launch Simulation Replicates

Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

Plots

Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

Heating

Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

Cooling

Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

Interactions

Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

Chapter 5

Hierarchical Index

5.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

App	30
Combobox	
Utils.UI.Controls.CascadingDropDownList	37
Utils.UI.Controls.DropDownList	49
Utils.Config	42
Utils.Constants	43
Utils.UI.Controls	43
Frame	
Utils.UI.Controls.CollapsibleFrame	41
Utils.UI.Controls.ScrollableContainer	76
Utils.Functions	66
Utils.Resources.Icons	68
Utils.IO	70
Listbox	
Utils.UI.Controls.LstBox	71
object	
CBuilding	37
CLights	38
COccupant	39
COccupantTemplate	40
CPresence	44
CShade	44
CShades	46
Simulation	80
Simulation.Building	36
Simulation.Building.Occupant	73
Simulation.Building.Occupant.Profile	75
Simulation.Building.Zone	85
Simulation.NoMASSModels	72
Simulation.NoMASSModels.AgentHeatGains	29
Simulation.NoMASSModels.Heating	67
Simulation.NoMASSModels.Lights	71
Simulation.NoMASSModels.Presence	74
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Simulation.NoMASSModels.Windows	84
Simulation.NoMASSModels.Windows.Window	83
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Utils.UI.Controls.ScrolledTreeView	77
Utils.UI.Controls.CascadingDropDownList	37
Utils.UI.Controls.CollapsibleFrame	41
Utils.UI.Controls.DropDownList	49
Utils.UI.Controls.LstBox	71
Utils.UI.Controls.ScrollableContainer	76
CWindow	46
CWindows	48
CZone	48
FrmBuilding	50
FrmConfiguration	50
FrmEmpty	52
FrmLights	52
FrmListOfZonesVerification	53
FrmLog	54
FrmOccupant	54
FrmOccupantTemplates	56
FrmPlots	57
FrmPresence	60
FrmRun	61
FrmShade	61
FrmShades	63
FrmWindow	63
FrmWindows	65
FrmZone	66
Utils.Resources	76
ToolTip	81
Treeview	
Utils.UI.Controls.ScrolledTreeView	77
Utils.UI	82
Utils	82
Utils.XML	84

Chapter 6

Class Index

6.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

Simulation.NoMASSModels.AgentHeatGains	29
App	30
Utils.UI.Controls.AutoScrollContainer	35
Simulation.Building	36
Utils.UI.Controls.CascadingDropDownList	37
CBuilding	37
CLights	38
COccupant	39
COccupantTemplate	40
Utils.UI.Controls.CollapsibleFrame	41
Utils.Config	42
Utils.Constants	43
Utils.UI.Controls	43
CPresence	44
CShade	44
CShades	46
CWindow	46
CWindows	48
CZone	48
Utils.UI.Controls.DropDownList	49
FrmBuilding	50
FrmConfiguration	50
FrmEmpty	52
FrmLights	52
FrmListOfZonesVerification	53
FrmLog	54
FrmOccupant	54
FrmOccupantTemplates	56
FrmPlots	57
FrmPresence	60
FrmRun	61
FrmShade	61
FrmShades	63
FrmWindow	63
FrmWindows	65

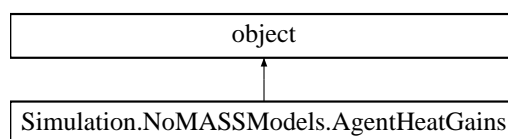
FrmZone	66
Utils.Functions	66
Simulation.NoMASSModels.Heating	67
Utils.Resources.Icons	68
Utils.IO	70
Simulation.NoMASSModels.Lights	71
Utils.UI.Controls.LstBox	71
Simulation.NoMASSModels	72
Simulation.Building.Occupant	73
Simulation.NoMASSModels.Presence	74
Simulation.Building.Occupant.Profile	75
Utils.Resources	76
Utils.UI.Controls.ScrollableContainer	76
Utils.UI.Controls.ScrolledTreeView	77
Simulation.NoMASSModels.Shades.Shade	78
Simulation.NoMASSModels.Shades	79
Simulation	80
ToolTip	81
Utils.UI	82
Utils	82
Simulation.NoMASSModels.Windows.Window	83
Simulation.NoMASSModels.Windows	84
Utils.XML	84
Simulation.Building.Zone	85

Chapter 7

Class Documentation

7.1 Simulation.NoMASSModels.AgentHeatGains Class Reference

Inheritance diagram for Simulation.NoMASSModels.AgentHeatGains:



Public Member Functions

- `def __init__(self)`

Public Attributes

- `enabled`

7.1.1 Detailed Description

Definition at line 168 of file CSimulation.py.

The documentation for this class was generated from the following file:

- CSimulation.py

7.2 App Class Reference

Public Member Functions

- def `createMainToolBar` (self, parent)
Create main tool bar Create the main tool bar.
- def `createStatusBar` (self, parent)
Create status bar Create status.
- def `exitCallback` (self)
Close application Destroy all resources before closing the application.
- def `freeResources` (self)
Destroy forms and widgets Destroy forms and widgets.
- def `resetProject` (self, loadDefaultNoMASSModels=False)
Reset data structures Reset data structures.
- def `newProject` (self)
Create a new empty project Create a new empty project.
- def `refreshTabEdit` (self, newHeight=None)
- def `openProject` (self)
Open a project Open a project.
- def `saveProject` (self)
Save current project Save current project.
- def `saveConfiguration` (self, filename, sessionID=None)
- def `loadConfiguration` (self)
- def `newItemNameExist` (self, typeOfItem, itemName, itemID=Utils.Constants.emptyGUID, parentID=None)
- def `appendZone` (self)
Append zone to the building Append zone to the building.
- def `appendOccupant` (self)
Append occupant to the building Append occupant to the building.
- def `TreeView_OnNodeSelect` (self, event, treeview)
Load data form Load data form.
- def `twBuildings_OnContextMenu` (self, event)
- def `updateOccupantZoneID` (self, key, newName)
- def `twBuildings_OnRenameItem` (self, event=None)
- def `twBuildings_OnDoubleClickItem` (self, event=None)
- def `existsOccupantsInZone` (self, zoneID)
- def `twBuildings_OnDeleteItem` (self, event=None)
- def `updateProgressBar` (self, value)
- def `sbmessage` (self, message)
- def `log` (self, message)
- def `appState` (self, value=None)
- def `createForms` (self)
- def `initTabEdit` (self)
- def `getListOfItemsByType` (self, typeOfClass)
- def `getItemByType` (self, typeOfClass)
- def `getListOfZones` (self)
- def `initBuilding` (self)
- def `loadModels` (self)
- def `__init__` (self, master)

Public Attributes

- **progressBar**
- **sbMessage**
- **simulation**
- **status**
- **appCurrentState**
- **fEmpty**
- **fLog**
- **fConfiguration**
- **fRun**
- **fPlots**
- **fBuilding**
- **fZone**
- **fOccupant**
- **fPresence**
- **fWindows**
- **fShades**
- **fLights**
- **fWindow**
- **fShade**
- **oBuilding**
- **oBuildingZones**
- **oBuildingOccupants**
- **oModels**
- **oPresence**
- **oWindows**
- **oShades**
- **oLights**
- **pltems**
- **master**
- **mainToolBar**
- **statusBar**
- **pnlNavigation**
- **rightPanel**
- **nbNavigation**
- **frmBuildings**
- **frmModels**
- **cmenuBuildings**
- **tvwBuildings**
- **tvwModels**
- **nbMain**
- **tabConfiguration**
- **tabEdit**
- **tabRun**
- **tabLog**
- **tabPlots**

7.2.1 Detailed Description

Definition at line 69 of file NoMASS_GUI.pyw.

7.2.2 Member Function Documentation

7.2.2.1 appendOccupant()

```
def appendOccupant (
    self )
```

Append occupant to the building Append occupant to the building.

Parameters

<i>self.</i>	
--------------	--

Definition at line 742 of file NoMASS_GUI.pyw.

7.2.2.2 appendZone()

```
def appendZone (
    self )
```

Append zone to the building Append zone to the building.

Parameters

<i>self.</i>	
--------------	--

Definition at line 699 of file NoMASS_GUI.pyw.

7.2.2.3 createMainToolbar()

```
def createMainToolbar (
    self,
    parent )
```

Create main tool bar Create the main tool bar.

Parameters

<i>self.</i>	
<i>parent.</i>	Parent widget

Definition at line 74 of file NoMASS_GUI.pyw.

7.2.2.4 createStatusBar()

```
def createStatusBar (
    self,
    parent )
```

Create status bar Create status.

Parameters

<i>self.</i>	
<i>parent.</i>	Parent widget

Definition at line 102 of file NoMASS_GUI.pyw.

7.2.2.5 exitCallback()

```
def exitCallback (
    self )
```

Close application Destroy all resources before closing the application.

Parameters

<i>self.</i>	
--------------	--

Definition at line 127 of file NoMASS_GUI.pyw.

7.2.2.6 freeResources()

```
def freeResources (
    self )
```

Destroy forms and widgets Destroy forms and widgets.

Parameters

<i>self.</i>	
--------------	--

Definition at line 138 of file NoMASS_GUI.pyw.

7.2.2.7 newProject()

```
def newProject (
    self )
```

Create a new empty project Create a new empty project.

Parameters

<i>self.</i>	
--------------	--

Definition at line 173 of file NoMASS_GUI.pyw.

7.2.2.8 openProject()

```
def openProject (
    self )
```

Open a project Open a project.

Parameters

<i>self.</i>	
--------------	--

Definition at line 194 of file NoMASS_GUI.pyw.

7.2.2.9 resetProject()

```
def resetProject (
    self,
    loadDefaultNoMASSModels = False )
```

Reset data structures Reset data structures.

Parameters

<i>self.</i>	
--------------	--

Definition at line 151 of file NoMASS_GUI.pyw.

7.2.2.10 saveProject()

```
def saveProject (
    self )
```

Save current project Save current project.

Parameters

<i>self.</i>	
--------------	--

Definition at line 211 of file NoMASS_GUI.pyw.

7.2.2.11 TreeView_OnNodeSelect()

```
def TreeView_OnNodeSelect (
    self,
    event,
    treeview )
```

Load data form Load data form.

Parameters

<i>self.</i>	
--------------	--

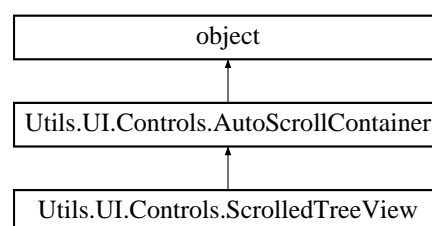
Definition at line 812 of file NoMASS_GUI.pyw.

The documentation for this class was generated from the following file:

- NoMASS_GUI.pyw

7.3 Utils.UI.Controls.AutoScrollContainer Class Reference

Inheritance diagram for Utils.UI.Controls.AutoScrollContainer:



Public Member Functions

- def `__init__` (self, master)

Static Public Member Functions

- def `OnAutoscroll` (scrollbar)

7.3.1 Detailed Description

Definition at line 737 of file CUtils.py.

7.3.2 Member Function Documentation

7.3.2.1 OnAutoscroll()

```
def OnAutoscroll (
    scrollbar ) [static]
```

Hide and show scrollbar as needed.

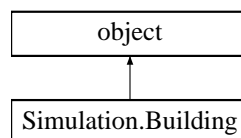
Definition at line 772 of file CUtils.py.

The documentation for this class was generated from the following file:

- CUtils.py

7.4 Simulation.Building Class Reference

Inheritance diagram for Simulation.Building:



Classes

- class [Occupant](#)
- class [Zone](#)

Public Member Functions

- def **getKey** (self)
- def **clearZones** (self)
- def **clearOccupants** (self)
- def **getZoneByName** (self, zoneName)
- def **__init__** (self, id=0, name="", zones=None, occupants=None)
- def **__repr__** (self)
- def **__cmp__** (self, other)

Public Attributes

- **id**
- **name**
- **zones**
- **occupants**

7.4.1 Detailed Description

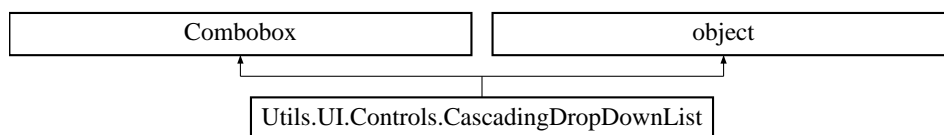
Definition at line 17 of file CSimulation.py.

The documentation for this class was generated from the following file:

- CSimulation.py

7.5 Utils.UI.Controls.CascadingDropDownList Class Reference

Inheritance diagram for Utils.UI.Controls.CascadingDropDownList:



Public Member Functions

- def **updateList** (self)
- def **setValue** (self, value)
- def **OnSelectionEvent** (self, event)
- def **__init__** (self, parent, args, kwargs)

7.5.1 Detailed Description

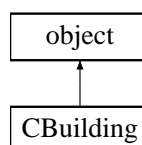
Definition at line 467 of file CUtils.py.

The documentation for this class was generated from the following file:

- CUtils.py

7.6 CBuilding Class Reference

Inheritance diagram for CBuilding:



Public Member Functions

- def **UUID** (self)
- def **type** (self)
- def **type** (self, value)
- def **ID** (self)
- def **ID** (self, value)
- def **name** (self)
- def **name** (self, value)
- def **__init__** (self, id=0, name="")

7.6.1 Detailed Description

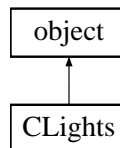
Definition at line 12 of file CBuilding.py.

The documentation for this class was generated from the following file:

- CBuilding.py

7.7 CLights Class Reference

Inheritance diagram for CLights:



Public Member Functions

- def **UUID** (self)
- def **type** (self)
- def **type** (self, value)
- def **ID** (self)
- def **ID** (self, value)
- def **enabled** (self)
- def **enabled** (self, value)
- def **__init__** (self, id=str(uuid.uuid4()), enabled=True)

7.7.1 Detailed Description

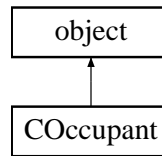
Definition at line 12 of file CLights.py.

The documentation for this class was generated from the following file:

- CLights.py

7.8 COccupant Class Reference

Inheritance diagram for COccupant:



Public Member Functions

- def **UUID** (self)
- def **type** (self)
- def **type** (self, value)
- def **ID** (self)
- def **ID** (self, value)
- def **name** (self)
- def **name** (self, value)
- def **zoneld** (self)
- def **zoneld** (self, value)
- def **zone** (self)
- def **zone** (self, value)
- def **power** (self)
- def **power** (self, value)
- def **windowId** (self)
- def **windowId** (self, value)
- def **window** (self)
- def **window** (self, value)
- def **shadeId** (self)
- def **shadeId** (self, value)
- def **shade** (self)
- def **shade** (self, value)
- def **activityId** (self)
- def **activityId** (self, value)
- def **sex** (self)
- def **sex** (self, value)
- def **familyID** (self)
- def **familyID** (self, value)
- def **educationID** (self)
- def **educationID** (self, value)
- def **ageGroup** (self)
- def **ageGroup** (self, value)
- def **ownComputer** (self)
- def **ownComputer** (self, value)
- def **isRetired** (self)
- def **isRetired** (self, value)
- def **isMarried** (self)
- def **isMarried** (self, value)
- def **isUnEmployed** (self)
- def **isUnEmployed** (self, value)
- def **__init__** (self, id=0, name="", zoneld="", zone="", power=0, windowId="", window="", shadeId="", shade="", activityId="", sex="", familyID="", educationID="", ageGroup="", ownComputer=False, isRetired=False, isMarried=False, isUnEmployed=False)

7.8.1 Detailed Description

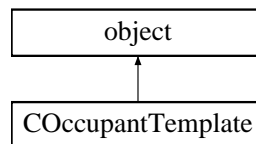
Definition at line 12 of file COccupant.py.

The documentation for this class was generated from the following file:

- COccupant.py

7.9 COccupantTemplate Class Reference

Inheritance diagram for COccupantTemplate:



Public Member Functions

- def **UUID** (self)
- def **UUID** (self, value)
- def **type** (self)
- def **type** (self, value)
- def **ID** (self)
- def **ID** (self, value)
- def **name** (self)
- def **name** (self, value)
- def **description** (self)
- def **description** (self, value)
- def **categoryID** (self)
- def **categoryID** (self, value)
- def **category** (self)
- def **category** (self, value)
- def **regionID** (self)
- def **regionID** (self, value)
- def **region** (self)
- def **region** (self, value)
- def **sectorID** (self)
- def **sectorID** (self, value)
- def **sector** (self)
- def **sector** (self, value)
- def **occupants** (self)
- def **occupants** (self, array)
- def **__init__** (self, id=0, name="", description="", categoryID="", category="", regionID="", region="", sectorID="", sector="", occupants=None)

7.9.1 Detailed Description

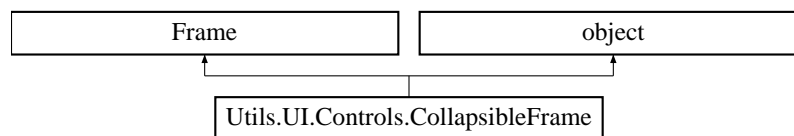
Definition at line 12 of file COccupantTemplate.py.

The documentation for this class was generated from the following file:

- COccupantTemplate.py

7.10 Utils.UI.Controls.CollapsibleFrame Class Reference

Inheritance diagram for Utils.UI.Controls.CollapsibleFrame:



Public Member Functions

- def **__init__** (self, parent, text=None, borderwidth=2, width=0, height=16, interior_padx=0, interior_pady=18, background=None, caption_separation=4, caption_font=None, caption_builder=None, icon_x=5, icon_open=None, icon_close=None)
- def **update_width** (self, width=None)
- def **open** (self)
- def **close** (self)
- def **toggle** (self)

Public Attributes

- **interior**

7.10.1 Detailed Description

Definition at line 548 of file CUtils.py.

The documentation for this class was generated from the following file:

- CUtils.py

7.11 Utils.Config Class Reference

Static Public Member Functions

- def **getDefaultWindowSize** ()
- def **getWindowTitle** ()
- def **getAppLocation** ()
- def **getDefaultWeatherFile** ()
- def **getDefaultIDF** ()
- def **getDefaultOutputDirectory** ()
- def **getEPlusLocation** ()
- def **getDefaultOccupantDensity** ()
- def **getValue** (section, variable)
- def **readConfigFile** (filename)
- def **getTooltip** (variable)
- def **getConfigurationFile** (fileName, item=None)
- def **getConfigurationXMLFile** (item=None)
- def **getAgentTemplatesXMLFile** (item=None)
- def **getCatalog** (szName, parentID=None)

Return list from the configuration file Return a list of options from the configuration file used in DropDownList controls.
- def **getCollection** (szName)

7.11.1 Detailed Description

Definition at line 88 of file CUtils.py.

7.11.2 Member Function Documentation

7.11.2.1 getCatalog()

```
def getCatalog (
    szName,
    parentID = None ) [static]
```

Return list from the configuration file Return a list of options from the configuration file used in DropDownList controls.

Parameters

<i>self</i>	
<i>szCatalog</i>	Name of the list
<i>parentID</i>	parentID to filter the list chosen

Definition at line 224 of file CUtils.py.

The documentation for this class was generated from the following file:

- CUtils.py

7.12 Utils.Constants Class Reference

Static Public Member Functions

- def **transparentColour** ()

Static Public Attributes

- string **emptyGUID** = "00000000-0000-0000-0000-000000000000"

7.12.1 Detailed Description

Definition at line 28 of file CUtils.py.

The documentation for this class was generated from the following file:

- CUtils.py

7.13 Utils.UI.Controls Class Reference

Classes

- class [AutoScrollContainer](#)
- class [CascadingDropDownList](#)
- class [CollapsibleFrame](#)
- class [DropDownList](#)
- class [LstBox](#)
- class [ScrollableContainer](#)
- class [ScrolledTreeView](#)

Static Public Member Functions

- def **ImageButton** (parent, imageData, command, toolTip=None)

7.13.1 Detailed Description

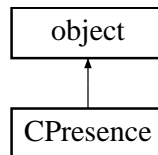
Definition at line 330 of file CUtils.py.

The documentation for this class was generated from the following file:

- CUtils.py

7.14 CPresence Class Reference

Inheritance diagram for CPresence:



Public Member Functions

- def **UUID** (self)
- def **type** (self)
- def **type** (self, value)
- def **ID** (self)
- def **ID** (self, value)
- def **enabled** (self)
- def **enabled** (self, value)
- def **__init__** (self, id=str(uuid.uuid4()), enabled=True)

7.14.1 Detailed Description

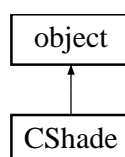
Definition at line 12 of file CPresence.py.

The documentation for this class was generated from the following file:

- CPresence.py

7.15 CShade Class Reference

Inheritance diagram for CShade:



Public Member Functions

- def **UUID** (self)
- def **type** (self)
- def **type** (self, value)
- def **ID** (self)
- def **ID** (self, value)
- def **name** (self)
- def **name** (self, value)
- def **a01arr** (self)
- def **a01arr** (self, value)
- def **b01inarr** (self)
- def **b01inarr** (self, value)
- def **b01sarr** (self)
- def **b01sarr** (self, value)
- def **a10arr** (self)
- def **a10arr** (self, value)
- def **b10inarr** (self)
- def **b10inarr** (self, value)
- def **b10sarr** (self)
- def **b10sarr** (self, value)
- def **a01int** (self)
- def **a01int** (self, value)
- def **b01inint** (self)
- def **b01inint** (self, value)
- def **b01sint** (self)
- def **b01sint** (self, value)
- def **a10int** (self)
- def **a10int** (self, value)
- def **b10inint** (self)
- def **b10inint** (self, value)
- def **b10sint** (self)
- def **b10sint** (self, value)
- def **afullraise** (self)
- def **afullraise** (self, value)
- def **boutfullraise** (self)
- def **boutfullraise** (self, value)
- def **bsfullraise** (self)
- def **bsfullraise** (self, value)
- def **bsfulllower** (self)
- def **bsfulllower** (self, value)
- def **boutfulllower** (self)
- def **boutfulllower** (self, value)
- def **afulllower** (self)
- def **afulllower** (self, value)
- def **aSFlower** (self)
- def **aSFlower** (self, value)
- def **bSFlower** (self)
- def **bSFlower** (self, value)
- def **shapelower** (self)
- def **shapelower** (self, value)
- def **__init__** (self, id=0, name="", a01arr=0, b01inarr=0, b01sarr=0, a10arr=0, b10inarr=0, b10sarr=0, a01int=0, b01inint=0, b01sint=0, a10int=0, b10inint=0, b10sint=0, afullraise=0, boutfullraise=0, bsfullraise=0, bsfulllower=0, boutfulllower=0, afulllower=0, aSFlower=0, bSFlower=0, shapelower=0)

7.15.1 Detailed Description

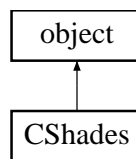
Definition at line 12 of file CShade.py.

The documentation for this class was generated from the following file:

- CShade.py

7.16 CShades Class Reference

Inheritance diagram for CShades:



Public Member Functions

- def **UUID** (self)
- def **type** (self)
- def **type** (self, value)
- def **ID** (self)
- def **ID** (self, value)
- def **enabled** (self)
- def **enabled** (self, value)
- def **__init__** (self, id=str(uuid.uuid4()), enabled=True)

7.16.1 Detailed Description

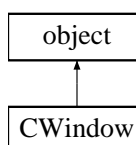
Definition at line 12 of file CShades.py.

The documentation for this class was generated from the following file:

- CShades.py

7.17 CWindow Class Reference

Inheritance diagram for CWindow:



Public Member Functions

- def **UUID** (self)
- def **type** (self)
- def **type** (self, value)
- def **ID** (self)
- def **ID** (self, value)
- def **name** (self)
- def **name** (self, value)
- def **aop** (self)
- def **aop** (self, value)
- def **bopout** (self)
- def **bopout** (self, value)
- def **shapeop** (self)
- def **shapeop** (self, value)
- def **a01arr** (self)
- def **a01arr** (self, value)
- def **b01inarr** (self)
- def **b01inarr** (self, value)
- def **b01outarr** (self)
- def **b01outarr** (self, value)
- def **b01absprevarr** (self)
- def **b01absprevarr** (self, value)
- def **b01rnarr** (self)
- def **b01rnarr** (self, value)
- def **a01int** (self)
- def **a01int** (self, value)
- def **b01inint** (self)
- def **b01inint** (self, value)
- def **b01outint** (self)
- def **b01outint** (self, value)
- def **b01presint** (self)
- def **b01presint** (self, value)
- def **b01rnint** (self)
- def **b01rnint** (self, value)
- def **a01dep** (self)
- def **a01dep** (self, value)
- def **b01outdep** (self)
- def **b01outdep** (self, value)
- def **b01absdep** (self)
- def **b01absdep** (self, value)
- def **b01gddep** (self)
- def **b01gddep** (self, value)
- def **a10dep** (self)
- def **a10dep** (self, value)
- def **b10indep** (self)
- def **b10indep** (self, value)
- def **b10outdep** (self)
- def **b10outdep** (self, value)
- def **b10absdep** (self)
- def **b10absdep** (self, value)
- def **b10gddep** (self)
- def **b10gddep** (self, value)
- def **__init__** (self, id=0, name="", aop=0, bopout=0, shapeop=0, a01arr=0, b01inarr=0, b01outarr=0, b01absprevarr=0, b01rnarr=0, a01int=0, b01inint=0, b01outint=0, b01presint=0, b01rnint=0, a01dep=0, b01outdep=0, b01absdep=0, b01gddep=0, a10dep=0, b10indep=0, b10outdep=0, b10absdep=0, b10gddep=0)

7.17.1 Detailed Description

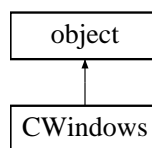
Definition at line 12 of file CWindow.py.

The documentation for this class was generated from the following file:

- CWindow.py

7.18 CWindows Class Reference

Inheritance diagram for CWindows:



Public Member Functions

- def **UUID** (self)
- def **type** (self)
- def **type** (self, value)
- def **ID** (self)
- def **ID** (self, value)
- def **enabled** (self)
- def **enabled** (self, value)
- def **__init__** (self, id=str(uuid.uuid4()), enabled=True)

7.18.1 Detailed Description

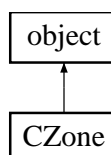
Definition at line 12 of file CWindows.py.

The documentation for this class was generated from the following file:

- CWindows.py

7.19 CZone Class Reference

Inheritance diagram for CZone:



Public Member Functions

- def **UUID** (self)
- def **type** (self)
- def **type** (self, value)
- def **ID** (self)
- def **ID** (self, value)
- def **name** (self)
- def **name** (self, value)
- def **activities** (self)
- def **activities** (self, value)
- def **groundFloor** (self)
- def **groundFloor** (self, value)
- def **windowCount** (self)
- def **windowCount** (self, value)
- def **floorArea** (self)
- def **floorArea** (self, value)
- def **__init__** (self, id=str(uuid.uuid4()), name="", activities="", groundFloor=False, windowCount=0, floor↵Area=0)

7.19.1 Detailed Description

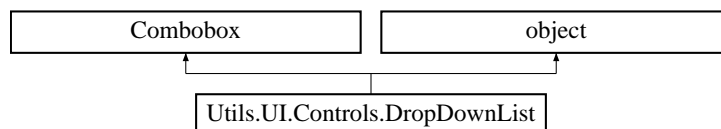
Definition at line 12 of file CZone.py.

The documentation for this class was generated from the following file:

- CZone.py

7.20 Utils.UI.Controls.DropDownList Class Reference

Inheritance diagram for Utils.UI.Controls.DropDownList:



Public Member Functions

- def **OnSelectedIndexChanged** (self, event=None)
- def **setVariable** (self, refTextVariable)
- def **setVariables** (self, refKeyVariable, refTextVariable)
- def **getElementByText** (self, textValue)
- def **resetSelection** (self)
- def **__init__** (self, parent, args, kwargs)

7.20.1 Detailed Description

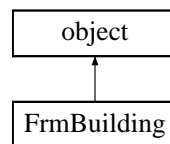
Definition at line 342 of file CUtils.py.

The documentation for this class was generated from the following file:

- CUtils.py

7.21 FrmBuilding Class Reference

Inheritance diagram for FrmBuilding:



Public Member Functions

- def **load** (self, id=None, name=None, show=False)
- def **show** (self)
- def **__init__** (self, master, parent, id=0, name="")

Public Attributes

- **lblname**
- **txtname**

7.21.1 Detailed Description

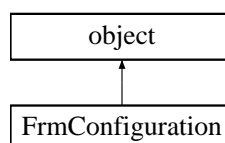
Definition at line 14 of file FBuilding.py.

The documentation for this class was generated from the following file:

- FBuilding.py

7.22 FrmConfiguration Class Reference

Inheritance diagram for FrmConfiguration:



Public Member Functions

- def **ID** (self)
- def **Frame** (self)
- def **typeOfBuilding** (self)
- def **area** (self)
- def **numberOfOccupants** (self)
- def **seed** (self)
- def **timeStepsPerHour** (self)
- def **beginMonth** (self)
- def **endMonth** (self)
- def **beginDay** (self)
- def **endDay** (self)
- def **learn** (self)
- def **save** (self)
- def **eplusVersion** (self)
- def **numberOfReplicates** (self)
- def **numberOfReplicatesRandom** (self)
- def **loadObjSimulation** (self, objSimulation)
- def **__init__** (self, parent, objSimulation)

Public Attributes

- **ddlTypeOfBuilding**
- **txtArea**
- **txtNumberOccupants**
- **txtSeed**
- **txtTimeStepsPHour**
- **txtBeginMonth**
- **txtEndMonth**
- **txtBeginDay**
- **txtEndDay**
- **chkLearn**
- **chkSave**
- **ddlEPlusVersion**
- **txtNumberReplicates**
- **txtNumberReplicatesRandom**

7.22.1 Detailed Description

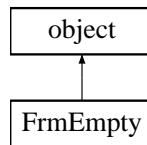
Definition at line 14 of file FConfiguration.py.

The documentation for this class was generated from the following file:

- FConfiguration.py

7.23 FrmEmpty Class Reference

Inheritance diagram for FrmEmpty:



Public Member Functions

- def **ID** (self)
- def **Frame** (self)
- def **load** (self, title=None)
- def **show** (self)
- def **title** (self)
- def **title** (self, value)
- def **__init__** (self, parent)

7.23.1 Detailed Description

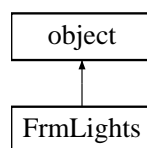
Definition at line 12 of file FEmpty.py.

The documentation for this class was generated from the following file:

- FEmpty.py

7.24 FrmLights Class Reference

Inheritance diagram for FrmLights:



Public Member Functions

- def **load** (self, varEnabled, show=False)
- def **show** (self)
- def **__init__** (self, master, parent, enabled=False)

Public Attributes

- **chkEnabled**

7.24.1 Detailed Description

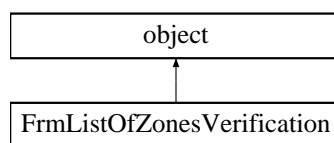
Definition at line 14 of file FLights.py.

The documentation for this class was generated from the following file:

- FLights.py

7.25 FrmListOfZonesVerification Class Reference

Inheritance diagram for FrmListOfZonesVerification:



Public Member Functions

- def **ID** (self)
- def **error** (self)
- def **confirm** (self)
- def **message** (self)
- def **OnCancel** (self, event=None)
- def **btnOK_OnClick** (self)
- def **compareLists** (self)
- def **__init__** (self, [top](#), pZonesIDF, pZonesGUI)

Public Attributes

- [top](#)
colours, icons
- **btnCancel**
- **btnOK**
- **lblzonesIDF**
- **lstZonesIDF**
- **lblzonesGUI**
- **lstZonesGUI**
- **lblMessage**

7.25.1 Detailed Description

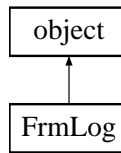
Definition at line 20 of file FListOfZonesVerification.py.

The documentation for this class was generated from the following file:

- FListOfZonesVerification.py

7.26 FrmLog Class Reference

Inheritance diagram for FrmLog:



Public Member Functions

- def **ID** (self)
- def **write** (self, value)
- def **__init__** (self, parent)

Public Attributes

- **txtLog**

7.26.1 Detailed Description

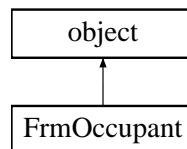
Definition at line 12 of file FLog.py.

The documentation for this class was generated from the following file:

- FLog.py

7.27 FrmOccupant Class Reference

Inheritance diagram for FrmOccupant:



Public Member Functions

- def **load** (self, id=None, name=None, description=None, categoryID=None, category=None, regionID=None, region=None, sectorID=None, sector=None, occupants=None, zones=None, show=False, enabled=False)
- def **updateZoneList** (self, zones)
- def **show** (self)
- def **__init__** (self, master, parent, uuid=str(uuid.uuid4()), id=0, name="", description="", categoryID="", category="", regionID="", region="", sectorID="", sector="", power=0, zoneId="", occupants=None, zones={"undefined":"undefined"})

Public Attributes

- **tabGeneral**
- **tabOccupant**
- **lblName**
- **txtname**
- **lbldescription**
- **txtdescription**
- **lblsector**
- **ddlSector**
- **lblregion**
- **ddlRegion**
- **lblcategory**
- **ddlCategory**
- **lblzone**
- **ddlZone**
- **lblpower**
- **txtPower**
- **lblwindowId**
- **ddlWindow**
- **lblshadeld**
- **ddlShade**
- **lblsex**
- **ddlGender**
- **lblfamilyID**
- **ddlFamily**
- **bleducationID**
- **ddlEducation**
- **lblageID**
- **ddlAge**
- **lblownComputer**
- **chkOwnComputer**
- **lblisRetired**
- **chkIsRetired**
- **lblisMarried**
- **chkIsMarried**
- **lblisUnEmployed**
- **chkIsEmployed**

7.27.1 Detailed Description

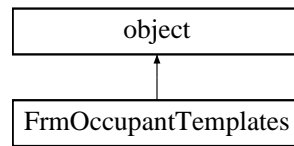
Definition at line 14 of file FOccupant.py.

The documentation for this class was generated from the following file:

- FOccupant.py

7.28 FrmOccupantTemplates Class Reference

Inheritance diagram for FrmOccupantTemplates:



Public Member Functions

- def **ID** (self)
- def **error** (self)
- def **message** (self)
- def **template** (self)
- def **clearOccupantsTab** (self)
- def **loadEmptyTemplate** (self)
- def **tvwTemplates_OnNodeExpand** (self, event)
- def **tvwTemplates_OnNodeCollapse** (self, event)
- def **tvwTemplates_OnNodeSelect** (self, event)
- def **OnCancel** (self, event=None)
- def **loadTemplatesFromFile** (self)
- def **getTemplate** (self, templateID)
- def **txtPower_OnPowerChanged** (self, sender)
- def **btnOK_OnClick** (self)
- def **__init__** (self, [top](#), pZones, value=None)

Public Attributes

- [top](#)
`configuration self.style = ttk.Style() if sys.platform == "win32": self.style.theme_use('winnative') self.style.configure('.`
- **tvwTemplates**
- **btnCancel**
- **btnOK**
- **dataContainer**
- **tabGeneral**
- **tabOccupants**
- **txtName**
- **txtDescription**
- **ddlSector**
- **ddlRegion**
- **ddlCategory**

7.28.1 Detailed Description

Definition at line 17 of file FOccupantTemplates.py.

7.28.2 Member Data Documentation

7.28.2.1 top

top

```
configuration self.style = ttk.Style() if sys.platform == "win32": self.style.theme_use('winnative') self.style.configure('.',background=_bgcolor) self.style.configure('.',foreground=_fgcolor) self.style.configure('.',font="TkDefaultFont") self.style.map('.',background= [('selected', _compcolor), ('active',_ana2color)])
```

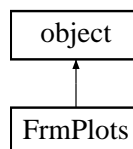
Definition at line 377 of file FOccupantTemplates.py.

The documentation for this class was generated from the following file:

- FOccupantTemplates.py

7.29 FrmPlots Class Reference

Inheritance diagram for FrmPlots:



Public Member Functions

- def **ID** (self)
- def **Frame** (self)
- def **selectOutputDirectory** (self)
- def **loadSimulationsAndPlot** (self)
- def **loadAreaPerZone** (self)
- def **loadSimulation** (self)
- def **exportVariable** (self)
- def **getVariableName** (self, variableName, periodType)
- def **convertJulesToWMS** (self, value, area)
- def **doPlot** (self, rootFolder, parentFolder, noReplicates, periodType, varName, bPlotAllZones, tsPHour)
- def **twvOutputVariables_OnDoubleClickItem** (self, event=None)
- def **__init__** (self, master, parent, objSimulation)

Public Attributes

- **period**
- **periodVariables**
- **simulation**
- **plotConfig**
- **txtSimulationstDirectory**
- **btnSelectSimulationsputDirectory**
- **btnLoad**
- **ddlTypeOfSimulation**
- **chkPlotAllZones**
- **btnExport**
- **tvwOutputVariables**
- **containerPlot**
- **lblPlotName**

Static Public Attributes

- **dtColumn** = dateTimeHdrLabelTmp
- list **bins** = [0,0,0,0,0,0,0,0,0,0,0]
- list **daysbins** = []
- list **monthbins**
- **timeStempsPerHour** = tsPHour
- int **currentMonth** = 0
- **colldx** = int(hdrldx[varName])
- **varDataColumn** = ds.values
- **uRows** = len(varDataColumn)
- int **tsPDay** = timeStempsPerHour*24
- **day** = int(uRow // (timeStempsPerHour*24))
- int **monthld** = 0
- list **lb** = monthbins[i][0] - 1
- list **ub** = monthbins[i][1] - 1
- **monthld** = i
- list **newRow** = []
- **outcsvfile** = pd.DataFrame(data=dataCollection, columns=hdrCollection)
- **index**
- **dataCollectionNormalised** = dataCollection
- int **tsPerMonth** = timeStempsPerHour*24*daysInMonth[m]
- **ds** = pd.read_csv(os.path.join(rootFolder, "%s_%s_normalised.csv" % (outputFilename, parentFolder.lower())))
- **header** = ds.columns.values.tolist()
- **headerZoneName** = header
- **data** = ds.values
- **zoneName** = varName.replace("WindowState0", "").strip()
- **fig** = Figure(figsize=(5,5))
- **a** = fig.add_subplot(111)
- int **leftColumn** = 0
- **bp** = a.boxplot(data[:,leftColumn:], 0, "")
- int **numPlots** = len(self.plotConfig["plotheadr"])-leftColumn
- **minDataValue** = np.amin(data[:,leftColumn:])
- **maxDataValue** = np.amax(data[:,leftColumn:])
- **rangeDataValue** = maxDataValue - minDataValue
- **fontsize**
- **horizontalalignment**

- **verticalalignment**
- **bbox**
- **transform**
- **transAxes**
- **True**
- **linestyle**
- **which**
- **color**
- **alpha**
- **linewidth**
- **marker**
- **def containerTemp** = tk.Frame(self.containerPlot)
- **canvas** = FigureCanvasTk(fig, master=containerTemp)
- **fill**
- **expand**
- **type**
- **dpi**
- **X**
- **pady**
- **title**
- **message**
- **csvFilename** = os.path.join(rootFolder, os.path.join(parentFolder, os.path.join("Simulation_%s" % str(1), "eplusout_%s.csv" % (periodType))))
- **hdrLabel** = header[uCol]
- **dateTimeHdrIdx** = uCol
- **dateTimeHdr** = ds[["Date/Time"]]
- **list dataCollection** = []
- **list hdrCollection** = []
- **bool isDataConverted** = False
- **varName** = header[uCol]
- **def variableSuffix** = self.getVariableName(varName, periodType)
- **bool isZone** = False;
- **bool isJules** = False
- **list units** = ["J", "C", "lux"]
- **string unit** = ""
- **insZone** = self.simulation.building.getZoneByName(zoneName)
- **plInstances** = re.findall(r"[]+%s[]+[\]+%s[]+[\$]" % (_unit, periodType), variableSuffix.strip())
- **unit** = _unit
- **monthname** = dateTimeHdr[i][0].strip()
- **newLabel** = headerZoneName[j].replace("24:00:00", "").strip()
- **newds** = pd.DataFrame(data, columns=header)

7.29.1 Detailed Description

Definition at line 39 of file FPlots.py.

7.29.2 Member Data Documentation

7.29.2.1 monthbins

```
list monthbins [static]
```

Initial value:

```
= [[1, 31],
    [32, 59],
    [60, 90],
    [91, 120],
    [121, 151],
    [152, 181],
    [182, 212],
    [213, 243],
    [244, 273],
    [274, 304],
    [305, 334],
    [335, 365]]
```

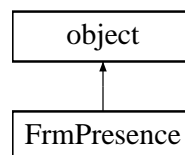
Definition at line 377 of file FPlots.py.

The documentation for this class was generated from the following file:

- FPlots.py

7.30 FrmPresence Class Reference

Inheritance diagram for FrmPresence:



Public Member Functions

- def **load** (self, varEnabled, show=False)
- def **show** (self)
- def **__init__** (self, master, parent, enabled=False)

Public Attributes

- **chkEnabled**

7.30.1 Detailed Description

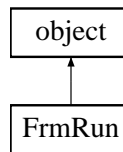
Definition at line 14 of file FPresence.py.

The documentation for this class was generated from the following file:

- FPresence.py

7.31 FrmRun Class Reference

Inheritance diagram for FrmRun:



Public Member Functions

- def **ID** (self)
- def **Frame** (self)
- def **idfFilename** (self)
- def **weatherFilename** (self)
- def **outputDirectory** (self)
- def **eplusLocation** (self)
- def **randomWindow** (self)
- def **randomShade** (self)
- def **selectIDFFile** (self)
- def **selectWeatherFile** (self)
- def **selectOutputDirectory** (self)
- def **selectEPlusLocation** (self)
- def **outputFileDirectoryExist** (self)
- def **appendIDFAddenda** (self, idfFilename, pZoneNames, epVersion)
- def **createModelDescription** (self, pZoneNames, epVersion)
- def **createFMU** (self, dest, modelDescriptionFilename)
- def **copyFilesToSimulationFolder** (self, sessionPath, dest, configLocation, modelDescriptionFilename, batchFilename)
- def **getZoneLisFromIDF** (self)
- def **getNameFromListByld** (self, pltems, key)
- def **compareLists** (self, zonesIDF, zonesGUI)
- def **execEPlusSimulationSequential** (self, args)
- def **saveAndRun** (self)

7.31.1 Detailed Description

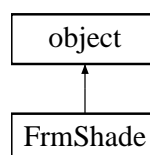
Definition at line 41 of file FRun.py.

The documentation for this class was generated from the following file:

- FRun.py

7.32 FrmShade Class Reference

Inheritance diagram for FrmShade:



Public Member Functions

- def **load** (self, id=0, name="", a01arr=0, b01inarr=0, b01sarr=0, a10arr=0, b10inarr=0, b10sarr=0, a01int=0, b01inint=0, b01sint=0, a10int=0, b10inint=0, b10sint=0, afullraise=0, boutfullraise=0, bsfullraise=0, bsfulllower=0, boutfulllower=0, afulllower=0, aSFlower=0, bSFlower=0, shapelower=0, show=False)
- def **show** (self)
- def **__init__** (self, master, parent, id=0, name="", a01arr=0, b01inarr=0, b01sarr=0, a10arr=0, b10inarr=0, b10sarr=0, a01int=0, b01inint=0, b01sint=0, a10int=0, b10inint=0, b10sint=0, afullraise=0, boutfullraise=0, bsfullraise=0, bsfulllower=0, boutfulllower=0, afulllower=0, aSFlower=0, bSFlower=0, shapelower=0)

Public Attributes

- **lblid**
- **txtid**
- **lblname**
- **txtname**
- **lbla01arr**
- **txta01arr**
- **lblb01inarr**
- **txtb01inarr**
- **lblb01sarr**
- **txtb01sarr**
- **lbla10arr**
- **txta10arr**
- **lblb10inarr**
- **txtb10inarr**
- **lblb10sarr**
- **txtb10sarr**
- **lbla01int**
- **txta01int**
- **lblb01inint**
- **txtb01inint**
- **lblb01sint**
- **txtb01sint**
- **lbla10int**
- **txta10int**
- **lblb10inint**
- **txtb10inint**
- **lblb10sint**
- **txtb10sint**
- **lblafullraise**
- **txtafullraise**
- **lblboutfullraise**
- **txtboutfullraise**
- **lblbsfullraise**
- **txtbsfullraise**
- **lblbsfulllower**
- **txtbsfulllower**
- **lblboutfulllower**
- **txtboutfulllower**
- **lblafulllower**
- **txtafulllower**
- **lblaSFlower**
- **txtaSFlower**
- **lblbSFlower**
- **txtbSFlower**
- **lblshapelower**
- **txtshapelower**

7.32.1 Detailed Description

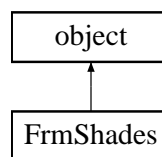
Definition at line 14 of file FShade.py.

The documentation for this class was generated from the following file:

- FShade.py

7.33 FrmShades Class Reference

Inheritance diagram for FrmShades:



Public Member Functions

- def **load** (self, varEnabled, show=False)
- def **show** (self)
- def **__init__** (self, master, parent, enabled=False)

Public Attributes

- **chkEnabled**

7.33.1 Detailed Description

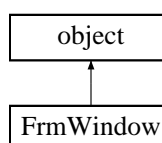
Definition at line 14 of file FShades.py.

The documentation for this class was generated from the following file:

- FShades.py

7.34 FrmWindow Class Reference

Inheritance diagram for FrmWindow:



Public Member Functions

- **def load** (self, id=None, name=None, aop=None, bopout=None, shapeop=None, a01arr=None, b01inarr=None, b01outarr=None, b01absprevarr=None, b01rnarr=None, a01int=None, b01inint=None, b01outint=None, b01presint=None, b01rnint=None, a01dep=None, b01outdep=None, b01absdep=None, b01gddep=None, a10dep=None, b10indep=None, b10outdep=None, b10absdep=None, b10gddep=None, show=False)
- **def show** (self)
- **def __init__** (self, master, parent, id=0, name="", aop=0, bopout=0, shapeop=0, a01arr=0, b01inarr=0, b01outarr=0, b01absprevarr=0, b01rnarr=0, a01int=0, b01inint=0, b01outint=0, b01presint=0, b01rnint=0, a01dep=0, b01outdep=0, b01absdep=0, b01gddep=0, a10dep=0, b10indep=0, b10outdep=0, b10absdep=0, b10gddep=0)

Public Attributes

- **lblid**
- **txtid**
- **lblname**
- **txtname**
- **lblaop**
- **txtaop**
- **lblbopout**
- **txtbopout**
- **lblshapeop**
- **txtshapeop**
- **lbla01arr**
- **txta01arr**
- **lblb01inarr**
- **txtb01inarr**
- **lblb01outarr**
- **txtb01outarr**
- **lblb01absprevarr**
- **txtb01absprevarr**
- **lblb01rnarr**
- **txtb01rnarr**
- **lbla01int**
- **txta01int**
- **lblb01inint**
- **txtb01inint**
- **lblb01outint**
- **txtb01outint**
- **lblb01presint**
- **txtb01presint**
- **lblb01rnint**
- **txtb01rnint**
- **lbla01dep**
- **txta01dep**
- **lblb01outdep**
- **txtb01outdep**
- **lblb01absdep**
- **txtb01absdep**
- **lblb01gddep**
- **txtb01gddep**
- **lbla10dep**

- **txta10dep**
- **lblb10indep**
- **txtb10indep**
- **lblb10outdep**
- **txtb10outdep**
- **lblb10absdep**
- **txtb10absdep**
- **lblb10gddep**
- **txtb10gddep**

7.34.1 Detailed Description

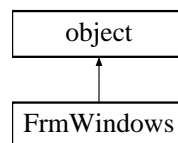
Definition at line 14 of file FWindow.py.

The documentation for this class was generated from the following file:

- FWindow.py

7.35 FrmWindows Class Reference

Inheritance diagram for FrmWindows:



Public Member Functions

- def **load** (self, varEnabled, show=False)
- def **show** (self)
- def **__init__** (self, master, parent, enabled=False)

Public Attributes

- **chkEnabled**

7.35.1 Detailed Description

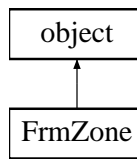
Definition at line 14 of file FWindows.py.

The documentation for this class was generated from the following file:

- FWindows.py

7.36 FrmZone Class Reference

Inheritance diagram for FrmZone:



Public Member Functions

- def **load** (self, id=None, name=None, activities=None, groundFloor=None, windowCount=None, floorArea=None, show=False, enabled=False)
- def **show** (self)
- def **__init__** (self, master, parent, id=str(uuid.uuid4()), name="", activities="", groundFloor=False, windowCount=0, floorArea=0)

Public Attributes

- **lblname**
- **txtname**
- **lblactivities**
- **lstActivities**
- **lblgroundFloor**
- **chkgroundFloor**
- **lblwindowCount**
- **txtwindowCount**
- **lblfloorArea**
- **txtfloorArea**

7.36.1 Detailed Description

Definition at line 14 of file FZone.py.

The documentation for this class was generated from the following file:

- FZone.py

7.37 Utils.Functions Class Reference

Static Public Member Functions

- def **concatenateDict** (dictA, dictB)
- def **subtractDict** (dictA, dictB)

7.37.1 Detailed Description

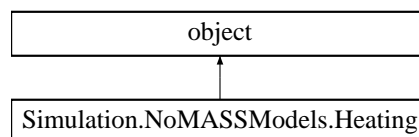
Definition at line 41 of file CUtils.py.

The documentation for this class was generated from the following file:

- CUtils.py

7.38 Simulation.NoMASSModels.Heating Class Reference

Inheritance diagram for Simulation.NoMASSModels.Heating:



Public Member Functions

- `def __init__(self)`

Public Attributes

- `enabled`

7.38.1 Detailed Description

Definition at line 174 of file CSimulation.py.

The documentation for this class was generated from the following file:

- CSimulation.py

- Generated by Doxygen

7.40.1 Detailed Description

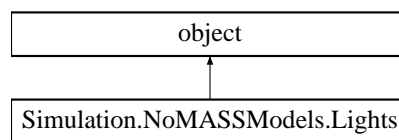
Definition at line 56 of file CUtils.py.

The documentation for this class was generated from the following file:

- CUtils.py

7.41 Simulation.NoMASSModels.Lights Class Reference

Inheritance diagram for Simulation.NoMASSModels.Lights:



Public Member Functions

- `def __init__(self)`

Public Attributes

- **enabled**

7.41.1 Detailed Description

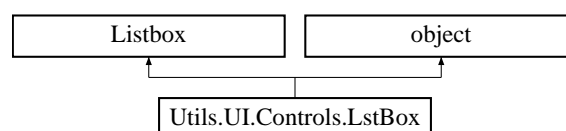
Definition at line 162 of file CSimulation.py.

The documentation for this class was generated from the following file:

- CSimulation.py

7.42 Utils.UI.Controls.LstBox Class Reference

Inheritance diagram for Utils.UI.Controls.LstBox:



Public Member Functions

- def **value** (self)
- def **value** (self, values)
- def **clearSelection** (self)
- def **selectedValues** (self)
- def **selectedValues** (self, listOfValues)
- def **refreshSelection** (self)
- def **OnSelect** (self, event=None)
- def **__init__** (self, master, sortList=False, list={}, args, kwargs)

Public Attributes

- **list**
- **sortList**

7.42.1 Detailed Description

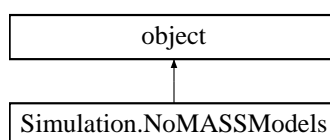
Definition at line 650 of file CUtils.py.

The documentation for this class was generated from the following file:

- CUtils.py

7.43 Simulation.NoMASSModels Class Reference

Inheritance diagram for Simulation.NoMASSModels:



Classes

- class [AgentHeatGains](#)
- class [Heating](#)
- class [Lights](#)
- class [Presence](#)
- class [Shades](#)
- class [Windows](#)

Public Member Functions

- def **__init__** (self)

Public Attributes

- **presence**
- **lights**
- **agentHeatGains**
- **heating**
- **windows**
- **shades**

7.43.1 Detailed Description

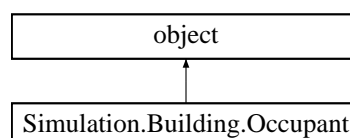
Definition at line 154 of file CSimulation.py.

The documentation for this class was generated from the following file:

- CSimulation.py

7.44 Simulation.Building.Occupant Class Reference

Inheritance diagram for Simulation.Building.Occupant:



Classes

- class [Profile](#)

Public Member Functions

- **def __init__** (self, id=0, name="", description="", categoryID="", category="", regionID="", region="", sectorID="", sector="", zoneID="", zone="", power=0, windowID="", window="", shadeID="", shade="", activityID="", sex="", familyID="", educationID="", ageGroup="", ownComputer=False, isRetired=False, isMarried=False, isUnEmployed=False)

Public Attributes

- **uuid**
- **id**
- **name**
- **description**
- **categoryID**
- **category**
- **regionID**
- **region**
- **sectorID**
- **sector**
- **zoneld**
- **zone**
- **power**
- **windowId**
- **window**
- **shadeld**
- **shade**
- **activityId**
- **sex**
- **familyID**
- **educationID**
- **ageGroup**
- **ownComputer**
- **isRetired**
- **isMarried**
- **isUnEmployed**
- **profile**

7.44.1 Detailed Description

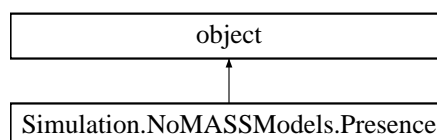
Definition at line 45 of file CSimulation.py.

The documentation for this class was generated from the following file:

- CSimulation.py

7.45 Simulation.NoMASSModels.Presence Class Reference

Inheritance diagram for Simulation.NoMASSModels.Presence:



Public Member Functions

- `def __init__(self)`

Public Attributes

- **enabled**

7.45.1 Detailed Description

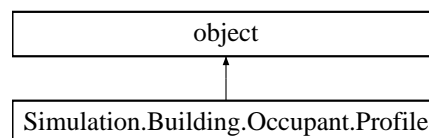
Definition at line 156 of file CSimulation.py.

The documentation for this class was generated from the following file:

- CSimulation.py

7.46 Simulation.Building.Occupant.Profile Class Reference

Inheritance diagram for Simulation.Building.Occupant.Profile:



Public Member Functions

- `def __init__(self)`

Public Attributes

- **ID**
- **template**
- **monday**
- **tuesday**
- **wednesday**
- **thursday**
- **friday**
- **saturday**
- **sunday**
- **p0**
- **p1**
- **p2**
- **p3**
- **p4**
- **p5**

- [p6](#)
- [p7](#)
- [p8](#)
- [p9](#)
- [p10](#)
- [p11](#)
- [p12](#)
- [p13](#)
- [p14](#)
- [p15](#)
- [p16](#)
- [p17](#)
- [p18](#)
- [p19](#)
- [p20](#)
- [p21](#)
- [p22](#)
- [p23](#)

7.46.1 Detailed Description

Definition at line 46 of file CSimulation.py.

The documentation for this class was generated from the following file:

- CSimulation.py

7.47 Utils.Resources Class Reference

Classes

- class [Icons](#)

7.47.1 Detailed Description

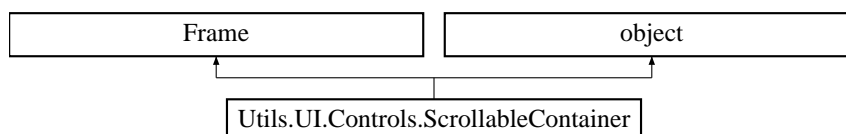
Definition at line 975 of file CUtils.py.

The documentation for this class was generated from the following file:

- CUtils.py

7.48 Utils.UI.Controls.ScrollableContainer Class Reference

Inheritance diagram for Utils.UI.Controls.ScrollableContainer:



Public Member Functions

- `def __init__ (self, parent, width=None, anchor="n", height=None, background=None, inner_frame=tk.Frame, kw)`
- `def width (self)`
- `def height (self)`
- `def setSize (self, width, height)`
- `def OnCanvas_Configure (self, event)`
- `def updateViewPort (self, newWidth=None, newHeight=None)`

Public Attributes

- `canvas`
- `yscrollbar`
- `xscrollbar`
- `innerframe`

7.48.1 Detailed Description

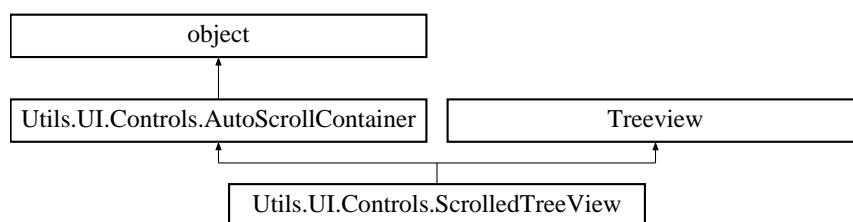
Definition at line 896 of file CUtils.py.

The documentation for this class was generated from the following file:

- CUtils.py

7.49 Utils.UI.Controls.ScrolledTreeView Class Reference

Inheritance diagram for Utils.UI.Controls.ScrolledTreeView:



Public Member Functions

- `def clearOnMove (self, event=None)`
- `def OnMotion (self, event)`
- `def showTip (self, itemId, text, event_x, event_y)`
- `def hideTip (self, event=None)`
- `def __init__ (self, master, kw)`

Public Attributes

- **last_focus**
- **tipwindow**
- **id**
- **x**
- **y**
- **text**
- **showToolTip**
- **container**

Additional Inherited Members

7.49.1 Detailed Description

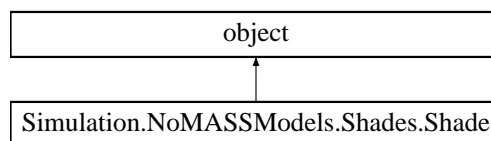
Definition at line 786 of file CUtils.py.

The documentation for this class was generated from the following file:

- CUtils.py

7.50 Simulation.NoMASSModels.Shades.Shade Class Reference

Inheritance diagram for Simulation.NoMASSModels.Shades.Shade:



Public Member Functions

- **def getKey** (self)
- **def __init__** (self, id=0, name="", a01arr=0, b01inarr=0, b01sarr=0, a10arr=0, b10inarr=0, b10sarr=0, a01int=0, b01inint=0, b01sint=0, a10int=0, b10inint=0, b10sint=0, afullraise=0, boutfullraise=0, bsfullraise=0, bsfulllower=0, boutfulllower=0, afulllower=0, aSFlower=0, bSFlower=0, shapelower=0)
- **def __repr__** (self)
- **def __cmp__** (self, other)

Public Attributes

- **id**
- **name**
- **a01arr**
- **b01inarr**
- **b01sarr**
- **a10arr**
- **b10inarr**
- **b10sarr**
- **a01int**
- **b01inint**
- **b01sint**
- **a10int**
- **b10inint**
- **b10sint**
- **afullraise**
- **boutfullraise**
- **bsfullraise**
- **bsfulllower**
- **boutfulllower**
- **afulllower**
- **aSFlower**
- **bSFlower**
- **shapelower**

7.50.1 Detailed Description

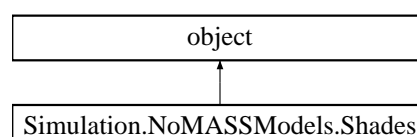
Definition at line 259 of file CSimulation.py.

The documentation for this class was generated from the following file:

- CSimulation.py

7.51 Simulation.NoMASSModels.Shades Class Reference

Inheritance diagram for Simulation.NoMASSModels.Shades:



Classes

- class [Shade](#)

Public Member Functions

- def **clear** (self)
- def **append** (self, objShade)
- def **__init__** (self)

Public Attributes

- **enabled**
- **shades**

7.51.1 Detailed Description

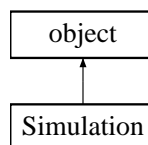
Definition at line 258 of file CSimulation.py.

The documentation for this class was generated from the following file:

- CSimulation.py

7.52 Simulation Class Reference

Inheritance diagram for Simulation:



Classes

- class [Building](#)
- class [NoMASSModels](#)

Public Member Functions

- def **resetValues** (self, insSimulation=None)
- def **loadFromFile** (self, filename)
- def **saveXML** (self)
- def **__init__** (self, insSimulation=None)

Public Attributes

- **filename**
- **sessionID**
- **typeOfBuilding**
- **area**
- **occupantDensity**
- **numberOfOccupants**
- **seed**
- **timeStepsPerHour**
- **beginMonth**
- **endMonth**
- **beginDay**
- **endDay**
- **learn**
- **save**
- **eplusVersion**
- **numberOfReplicates**
- **numberOfReplicatesRandom**
- **idfFilename**
- **weatherFilename**
- **outputDirectory**
- **eplusLocation**
- **randomWindow**
- **randomShade**
- **building**
- **models**
- **outputVariables**

7.52.1 Detailed Description

Definition at line 14 of file CSimulation.py.

The documentation for this class was generated from the following file:

- CSimulation.py

7.53 ToolTip Class Reference

Public Member Functions

- **def __init__** (self, widget)
- **def showtip** (self, text)
- **def hidetip** (self)

Public Attributes

- **widget**
- **tipwindow**
- **id**
- **x**
- **y**
- **text**

7.53.1 Detailed Description

Definition at line 7 of file CToolTip.py.

The documentation for this class was generated from the following file:

- CToolTip.py

7.54 Utils.UI Class Reference

Classes

- class [Controls](#)

Static Public Member Functions

- def **createMainMenuBar** (parent, commandNew, commandOpen, commandSave, commandExit)

7.54.1 Detailed Description

Definition at line 317 of file CUtils.py.

The documentation for this class was generated from the following file:

- CUtils.py

7.55 Utils Class Reference

Classes

- class [Config](#)
- class [Constants](#)
- class [Functions](#)
- class [IO](#)
- class [Resources](#)
- class [UI](#)
- class [XML](#)

7.55.1 Detailed Description

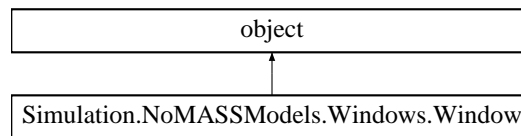
Definition at line 27 of file CUtils.py.

The documentation for this class was generated from the following file:

- CUtils.py

7.56 Simulation.NoMASSModels.Windows.Window Class Reference

Inheritance diagram for Simulation.NoMASSModels.Windows.Window:



Public Member Functions

- **def getKey** (self)
- **def __init__** (self, id=0, name="", aop=0, bopout=0, shapeop=0, a01arr=0, b01inarr=0, b01outarr=0, b01absprevarr=0, b01rnarr=0, a01int=0, b01inint=0, b01outint=0, b01presint=0, b01rnint=0, a01dep=0, b01outdep=0, b01absdep=0, b01gddep=0, a10dep=0, b10indep=0, b10outdep=0, b10absdep=0, b10gddep=0)
- **def __repr__** (self)
- **def __cmp__** (self, other)

Public Attributes

- **id**
- **name**
- **aop**
- **bopout**
- **shapeop**
- **a01arr**
- **b01inarr**
- **b01outarr**
- **b01absprevarr**
- **b01rnarr**
- **a01int**
- **b01inint**
- **b01outint**
- **b01presint**
- **b01rnint**
- **a01dep**
- **b01outdep**
- **b01absdep**
- **b01gddep**
- **a10dep**
- **b10indep**
- **b10outdep**
- **b10absdep**
- **b10gddep**

7.56.1 Detailed Description

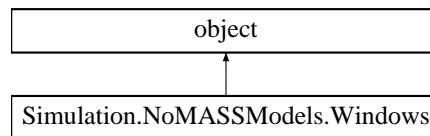
Definition at line 181 of file CSimulation.py.

The documentation for this class was generated from the following file:

- CSimulation.py

7.57 Simulation.NoMASSModels.Windows Class Reference

Inheritance diagram for Simulation.NoMASSModels.Windows:



Classes

- class [Window](#)

Public Member Functions

- def **clear** (self)
- def **append** (self, objWindow)
- def **__init__** (self)

Public Attributes

- **enabled**
- **windows**

7.57.1 Detailed Description

Definition at line 180 of file CSimulation.py.

The documentation for this class was generated from the following file:

- CSimulation.py

7.58 Utils.XML Class Reference

Static Public Member Functions

- def **setIndentation** (element, level=0)

7.58.1 Detailed Description

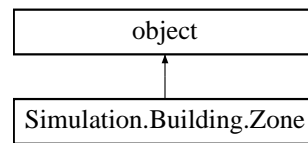
Definition at line 300 of file CUtils.py.

The documentation for this class was generated from the following file:

- CUtils.py

7.59 Simulation.Building.Zone Class Reference

Inheritance diagram for Simulation.Building.Zone:



Public Member Functions

- `def __init__ (self, id=0, name="Undefined", activities="", isGroundFloor=False, windowCount=0, floorArea=0)`
- `def __repr__ (self)`

Public Attributes

- `id`
- `name`
- `activities`
- `isGroundFloor`
- `windowCount`
- `floorArea`
- `varName`

7.59.1 Detailed Description

Definition at line 22 of file `CSimulation.py`.

The documentation for this class was generated from the following file:

- `CSimulation.py`

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