NOTE: These demo notes assume that you have installed the UT 3.0 version of the ALMA Observing Tool package. This is available at

http://www.eso.org/~mschilli/webstart-ot-UT3.0/

or

http://www.eso.org/~mschilli/tarball-ot-UT3.0/

Demo:

[launch X11]

cd almaot
./ALMA-OT.cmd

[Science View tab will be automatically selected]
[Forms tab in Editors will be automatically selected]
[shrink the Reserved for future use window]
[shrink the Feedback window]
[choose File - New Project]
[click on Project folder if necessary to see Project Information]
[Fill in PI - "I.M.A. Newbie"]
[Fill in Project - Star Formation in Ophiuchus]
[Fill in Version - 1.0]
[click on Science View folder]

(This enables Target Space information to be added)
(A Target Space contains one or more targets or mapping areas that are related and are nearby on the sky and would be covered by a single target name)

[choose Edit - Add Empty Target Space]
[click on TargetSpace folder and enter a Name]

(Multiple Target Spaces can be created)

[click on the TargetSpace folder and enter Name - Ophiuchus]
[select Edit - Add Circle]

(This adds a Region of Interest. An RoI defines an individual target or map and as well as the spectral setup information for the observation. Several RoIs can be defined within a Target Space. RoIs can be used to observe single interferometer fields, or to map circular, elliptical, rectangular, or more complicated shaped regions on the sky)

(Within an RoI there can be multiple Spectral Elements, so that an individual map can be observed in several spectral setups)

[click on your RoI and enter its Name - HH-224 South]

(The Script field allows you to select a specific reduction script for this RoI)

[click on Circle folder]
[enter its Name - Centre Position]
[enter RA and Dec - 16:27:22.6 -24:48:54.0]
[set Radius to zero]
(Radius = 0 means a single field observation)
(Spacing is the field spacing if you are mapping)

[click on Spectral Element]
[enter its Name - Continuum 350 GHz]
[click on Spectral Element]
[enter its Name - Continuum 670 GHz]

(Note that Science View does not yet properly support spectral line observations and doesn't actually let you specify the angular resolution you want!)

[For each Spectral Element, enter in the Bandwidth - 16 GHz, the required Sensitivity - 0.15 mJy for 350 GHz, 1 mJy for 670 GHz, Centre - 350 GHz or 670 GHz, Resolution - 16 GHz, PWVC - 1.2 mm for 350 GHz, 0.5 mm for 670 GHz]

(Can then Calculate Sensitivity, or vice versa the Exposure Time)

(Can also call up the Exposure Time Calculator from below the menu bar to play with)

(Another useful tool is the ALMA Calibrator Selection Tool)
(Can enter in the position of HH224S to see what nearby calibrators are available, RA 16:27:22.6 Dec -24:48:54.0, say within Radius - 1 degree)

(At this point, we can use the below-menu command Validate to check that the observing programme is complete, internally consistent, and compatible with the observing rules defined by the ALMA system configuration. At present it fails...)

(Presuming your programme is in fact Validates successfully, the below-menu item Mapper is then used to convert your entries into scheduling blocks using standard system modes and setups consistent with the defined observing programme)

(You can switch back and forth between the Science View and System View. if we do that we can delve deeper into the OT's functions to define the details of an observation)

[click on System View]

(In System View the Observing Unit Set is the counterpart to the Science View folder, within which a second OUS plays the role of the Target Space. The next level down holds the actual scheduling block)

(SBs contain Observing Target and Calibration Target information)

[click on the uppermost OUS]

(System view has the Forms tab in the Editors but also has a Visual tab for defining the details of the frequency setup and correlator and baseband configuration)

[click on Visual to show it and then click on Forms again]

(In System View you can see all of the gory details on how to set up your ALMA observation. Let's create an observing programme in this expert mode)

[select File - New project]
[Fill in the project information]

[click on the OUS]

(OUS's contain other OUS's and Scheduling Blocks, which are the fundamental structure that defines a single ALMA observation)

At the top level of the OUS you set parameters that apply to the entire OUS. These include basic control parameters such as maximum time to be spent, and pointing and bandpass calibration accuracies required, dependencies between different OUSs, selection of control and processing scripts, and the desired specifications for the output data after processing the complete OUS)

The SchedBlock defines the observing and calibration targets, the observing sequence, and the frequency and correlator setups)

(An important function of the SB is to set the preconditions required in order that the SB be allowed to proceed on the telescope. These observing conditions are the maximum PWVC, the radio seeing, phase stability conditions, and allowed hour angle range)

(Performance goals after data calibration include the allowable angular resolution range and minimum dynamic range)

(The SB contains one or more observing targets and a variety of different calibration targets)

[click on Observing Targets and select Edit - Add Observing Target]
[select Target]

(The science target is selected here. Target can be specified by coordinates or a source name can be entered and resolved by an external database - try NGC 1333 at 03:29:02 +31:20:54)

(The reference position and total power sampling time are used for single dish total power observations)

(The Field Pattern specifies the arrangement of fields to be observed, such as a user-specified list of individual field centres, a circular or rectangular area, and maybe even a spiral (not yet supported))

(Before continuing on to the frequency and correlator setup, let's jump briefly to the calibrator targets. Each type of calibrator target, phase, amplitude, pointing, polarization, focus, bandpass, have their own customized setup forms. The Calibration Selection Tool will help you select the best calibration sources for your observations)

[choose Calibrator Selection Tool]

(It automatically loads in the coordinates of your target. You can then select a radius within which to search for nearby calibrators. Choose 10 degrees and click on Filter)

(You might not want a calibrator that far away but this is just a demo calibrator pointing list)

(You can also let the database find the best calibrator for different purposes. Choose one and then press Select as...)

(Let's go back to the target source and look at frequencies and correlator setups. This is where the flexibility of the ALMA receivers and correlator really shows)

(The Spectal Spec chooses integration time and required dynamic range. frequency setup chooses the main frequency of interest, either as a frequency or a line lookup. Click on Line Catalogue and choose CO(1-0). This is in Band 3)

(A useful way to set the frequency and correlator is through the VIsual editor, which gives a nice GUI interface)

[choose Visual]

(You see an atmospheric transmission curve with the ALMA receiver band tuning ranges. We have chose a frequency in Band 3, so we can zoom in on it. The CO transition we chose is marked. As I said earlier, the receiver bands receive in two RF frequency bands determined by the LO setting. Lets set it to around 109 GHz so that we get the CO line in one of the sidebands. Since the CO line is near the upper tuning range for Band 3, we can only put it in the USB)

(As mentioned before, the total bandwidth can be split into 4 pairs of frequency basebands which provide for the selection of particular frequency ranges of interest. In our example, we clearly want a BB covering the CO line, so click on Add Config and select Config 0. Choose the CO(1-0) line and select the bandwidth we want for spectrocopy, say 125 MHz. In actual fact at present there is an offset between the desired and displayed BB frequencies, so I have to adjust it to 114.7 GHz)

(We can take advantage of the correlator to put a BB on top of another line. We notice that there is a C17O(1-0) line just outside the lower edge of the USB. We can adjust the position of the USB by changing LO1 to make the CO and C17O lines simultaneously visible. Add config and choose Config 1. Enter frequency 111.8 GHz and choose only 62.5 MHz because we want higher frequency resolution in this band)

(To optimize the frequency settings, click on Best. The LO gets adjusted to put both lines within the USB. Two lines for the price of one! The optimized LO setting is 106.7825 GHz)

(A similar process can be made to insert two more BBs, in either of the two sidebands, and provided you take care of the sideband constraints, you observe 4 separate subbands in a single observation)