

MIDI Keys and Note examples:

Note	MIDI Key	Pause
C0	60	P-1 P-2 P-4 P-8 P-16 P-32
D0	62	
E0	64	Notes
F0	65	C-1 C-2 C-4 C-8 C-16 C-32
G0	67	
A0	69	Example Jingle Bells
H0	71	E0-4 E0-4 E0-2
C1	72	E0-4 E0-4 E0-2
D1	74	E0-4 G0-4 C0-4 D0-4
E1	76	E0-1
F1	77	F0-4 F0-4 F0-4 F0-4
G1	79	F0-4 E0-4 E0-4 E0-8 E0-8
A1	81	E0-4 D0-4 D0-4 E0-4
H1	83	D0-2 G0-2

To generate sound we use the JAVA MIDI package *javax.sound.midi*. We declare a MIDI object first. To work with this interface nicely, we define 3 helper functions (you can use copy&paste to place this in your VCC global code definition).

```

javax.sound.midi.Synthesizer synth = null;

public void initMidi() {
    try {
        // Locate the default synthesizer
        synth = javax.sound.midi.MidiSystem.getSynthesizer();
        // Open the synthesizer
        synth.open();
    }
    catch (Exception exc) {exc.printStackTrace();}
}

public void playNote(int Key, int Duration) {
    if (synth == null) initMidi();
    try {
        // Get the available Midi channels
        javax.sound.midi.MidiChannel channels[] =
            synth.getChannels();
        // Play a note on channel 1
        if(Key != -1) channels[1].noteOn(Key, 127);
        // Give the note some time to play
        Thread.sleep(Duration);
        // Turn the note off
        if(Key != -1) channels[1].noteOff(Key);
    }
    catch (Exception exc) {exc.printStackTrace();}
}

public void destroyMidi ()
{
    try {
        // Close the synthesizer device
        synth.close();
    }
    catch (Exception exc) {exc.printStackTrace();}
}

```

Tasks:

- » *Develop an interpreter for the note-language ML*
- » *Create a T-Diagram in TDiag for the interpreter you are going to build.*
- » *Define a formal grammar in BNF for ML. The examples given in the table represent one possible notation.*
- » *Provide a syntax diagram for ML.*
- » *Create a scanner and parser definition in VCC and develop S attributes.*
- » *You need to play notes with the helper function playNote according to the MIDI Key table.*
playNote(-1,n) can be used for pause.
- » *Generate the interpreter by clicking on „generate Compiler“.*
- » *Test your interpreter with multiple examples in T-Diag (in your T-Diagram).*