In [2]:

```python
from scipy import signal
from scipy.fft import fftshift
import matplotlib.pyplot as plt
import librosa
import librosa.display
import librosa.core
import numpy as np
```

In [3]:

```python
y,sr = librosa.load("samplefans1.wav")
print(type(y), type(sr))
```

```
<class 'numpy.ndarray'> <class 'int'>
```

In [4]:

```python
print(y.shape, sr)
```

```
(2861444,) 22050
```
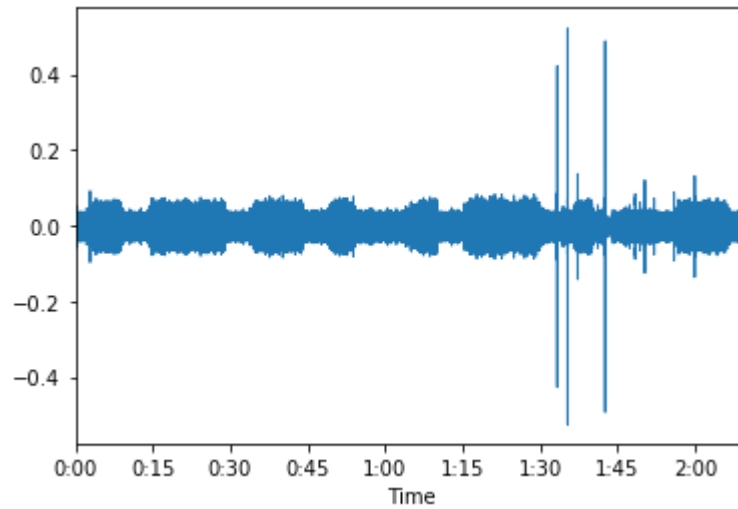
In [5]:

```
librosa.display.waveplot(y,sr)
```

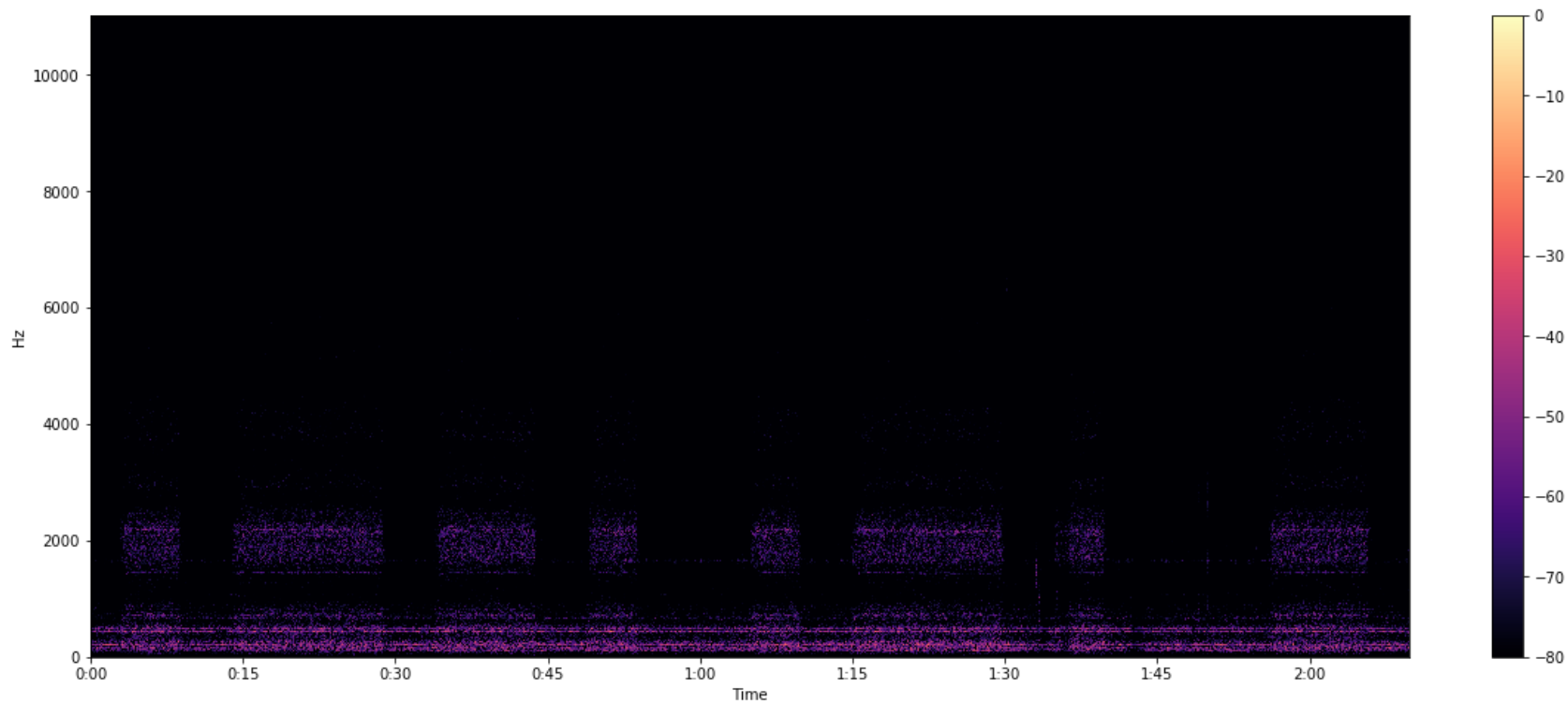Out[5]:

<matplotlib.collections.PolyCollection at 0x25892a7b310>

In [29]:

```python
D = librosa.stft(y)
log_power = librosa.amplitude_to_db(np.abs(D**3), ref=np.max)
plt.figure(figsize=(20, 8))
librosa.display.specshow(log_power, x_axis='time', y_axis='linear')
plt.colorbar();
```
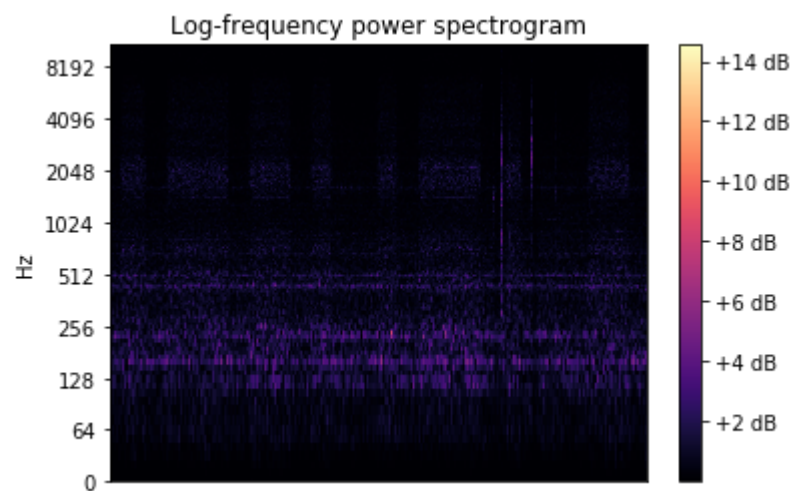
In [22]:

```
librosa.display.specshow(D, y_axis='log')
plt.colorbar(format='%+2.0f dB')
plt.title('Log-frequency power spectrogram')
```

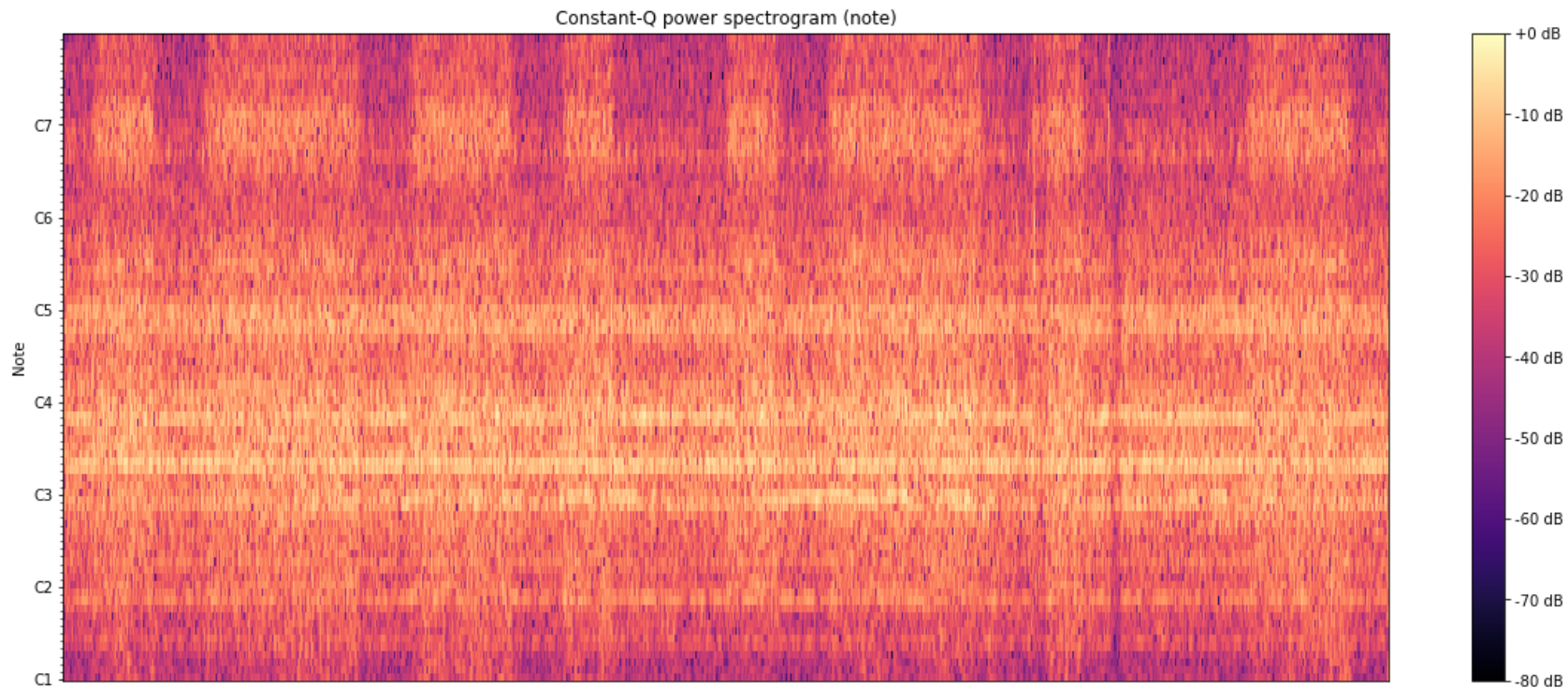Out[22]:

Text(0.5, 1.0, 'Log-frequency power spectrogram')

In [26]:

```python
CQT = librosa.amplitude_to_db(np.abs(((librosa.cqt(y, sr)))), ref=np.max)
plt.figure(figsize=(20, 8))
librosa.display.specshow((CQT), y_axis='cqt_note')
plt.colorbar(format='%+2.0f dB')
plt.title('Constant-Q power spectrogram (note)')
```

Out[26]:

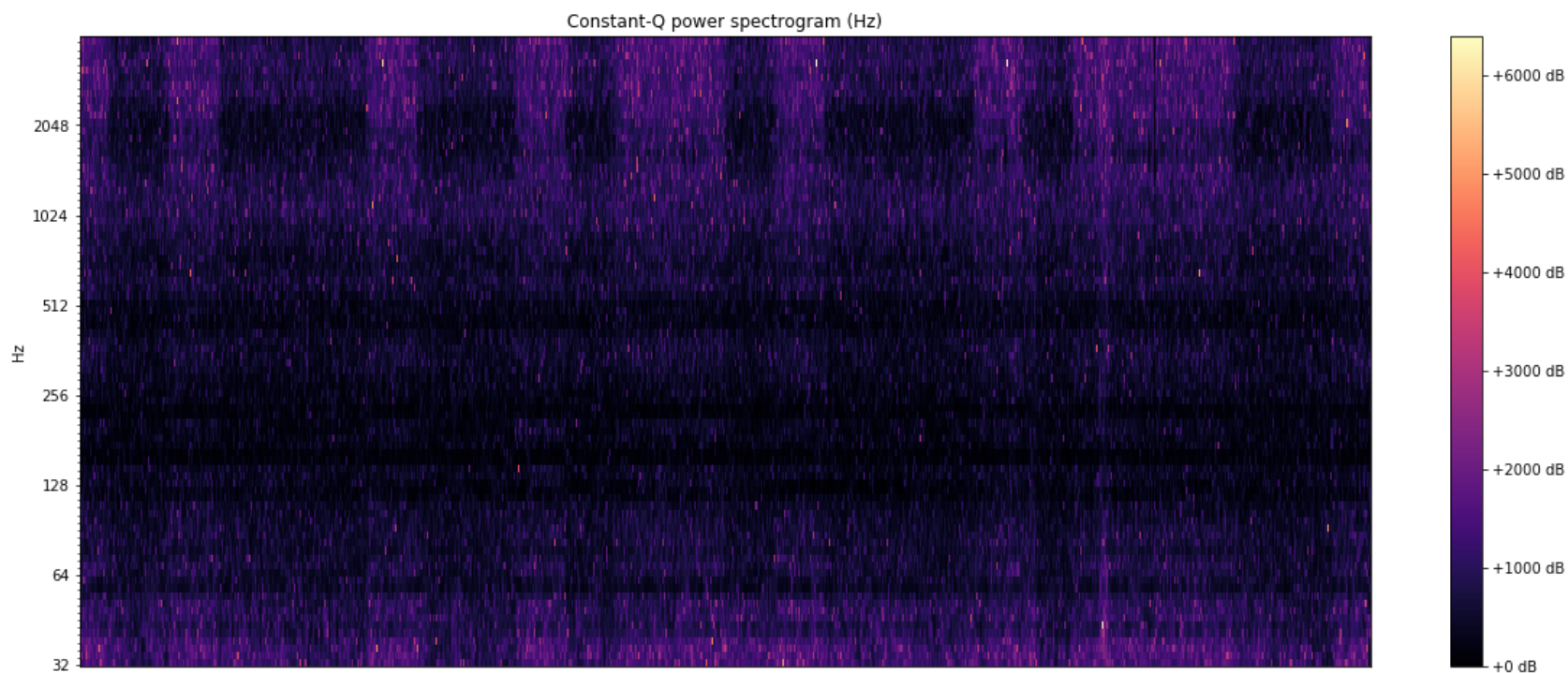Text(0.5, 1.0, 'Constant-Q power spectrogram (note)')

In [27]:

```python
plt.figure(figsize=(20, 8))
librosa.display.specshow((CQT**2), y_axis='cqt_hz')
plt.colorbar(format='%+2.0f dB')
plt.title('Constant-Q power spectrogram (Hz)')
```
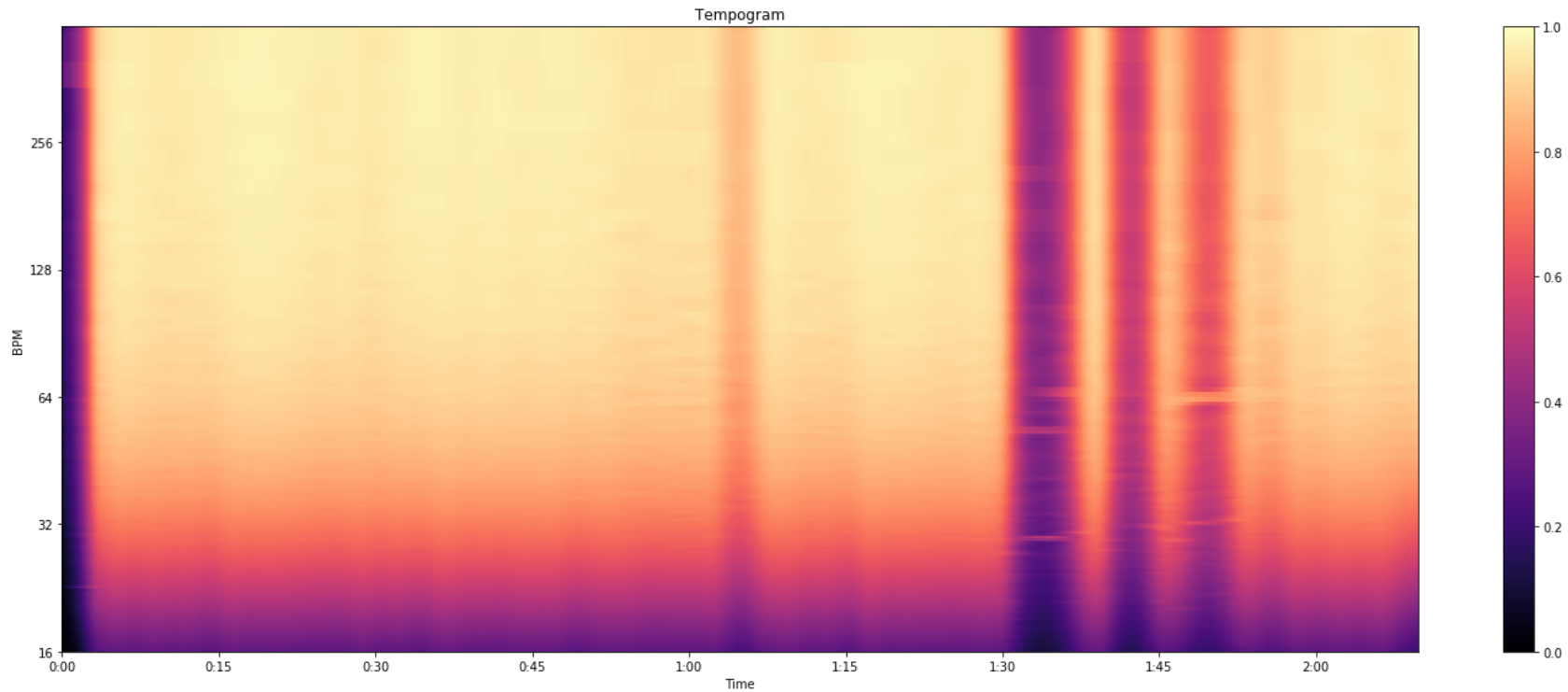
Out[27]:

Text(0.5, 1.0, 'Constant-Q power spectrogram (Hz)')

In [10]:

```
Tgram = librosa.feature.tempogram(y=y, sr=sr)
plt.figure(figsize=(20, 8))
librosa.display.specshow(Tgram, x_axis='time', y_axis='tempo')
plt.colorbar()
plt.title('Tempogram')
plt.tight_layout()
plt.show()
```
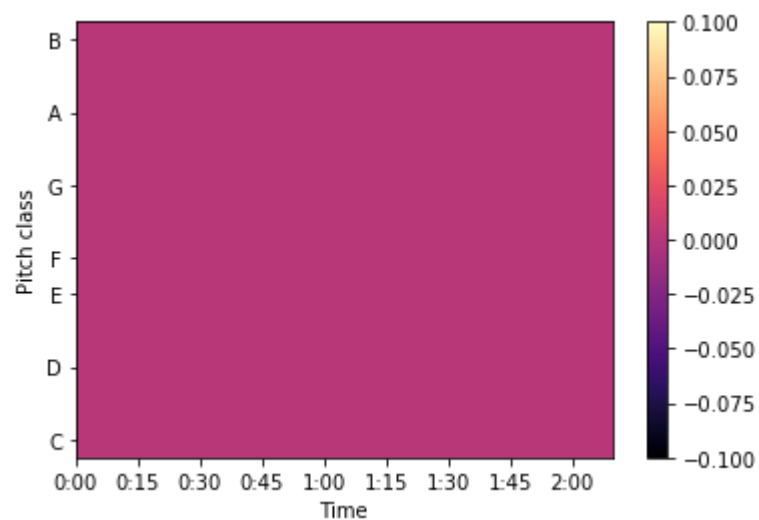
In [11]:

```python
chroma = librosa.feature.chroma_cqt(C=CQT, sr=sr)
librosa.display.specshow(chroma, x_axis='time', y_axis='chroma')
plt.colorbar()
```

Out[11]:

<matplotlib.colorbar.Colorbar at 0x258934bc970>

In [ ]:

In [ ]: