# Google Cloud Speech APIs

## Text-to-Speech & Speech-to-Text

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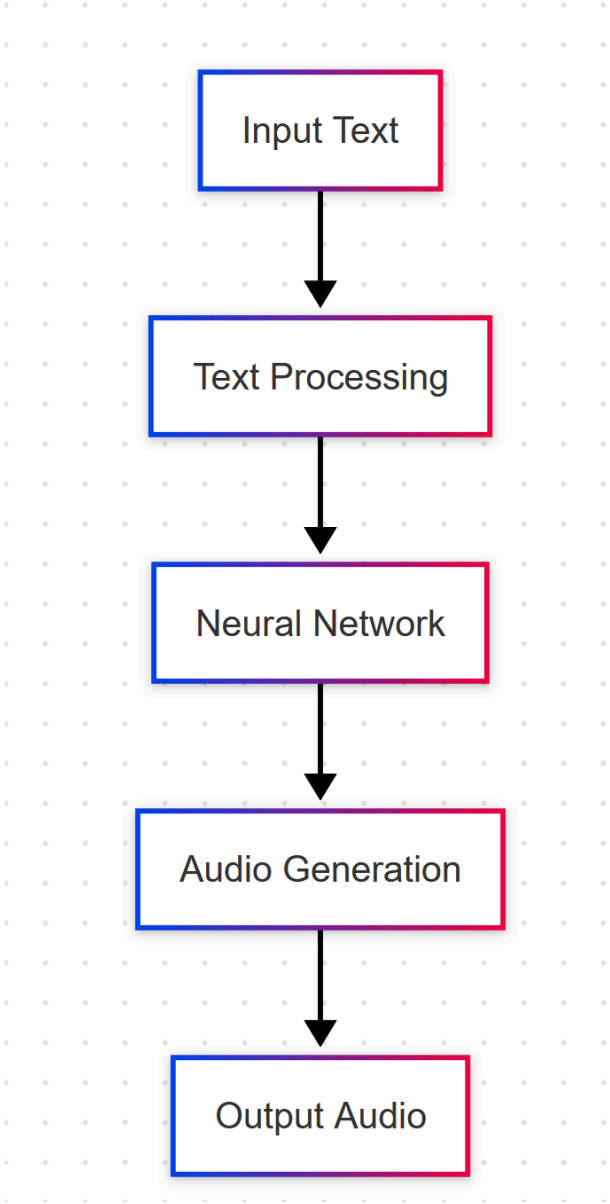
# Overview

- **Text-to-Speech (TTS)**
  - Converts text into natural-sounding speech
  - Uses advanced neural networks
  - Supports multiple languages and voices
- **Speech-to-Text (STT)**
  - Converts audio into text
  - Real-time and batch processing
  - High accuracy with machine learning

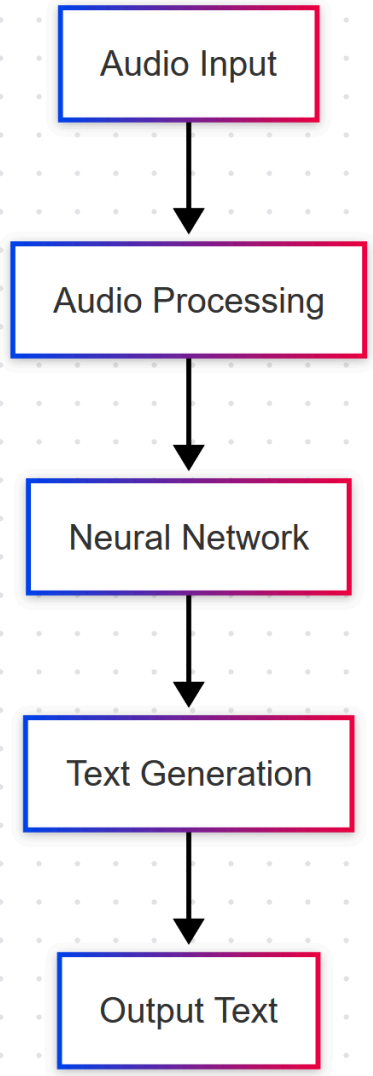



# Text-to-Speech API Architecture

- **Input Processing**
  - Text normalization
  - SSML support
  - Language detection
- **Neural Network**
  - WaveNet technology
  - Neural vocoder
  - Prosody modeling

# Speech-to-Text API Architecture

- **Audio Processing**
  - Noise reduction
  - Audio format conversion
  - Channel separation
- **Neural Network**
  - Deep learning models
  - Context awareness
  - Language adaptation



# Key Features

## Text-to-Speech

- Multiple voice types
- Custom voice creation
- SSML support
- Audio format options
- Speaking rate control
- Pitch adjustment

## Speech-to-Text

- Real-time streaming
- Batch processing
- Speaker diarization
- Word-level confidence
- Punctuation
- Multiple channel support

# Supported Languages

## Text-to-Speech

- 50+ languages
- 200+ voices
- Neural voices available
- Custom voice training

## Speech-to-Text

- 125+ languages
- Regional variants
- Automatic language detection
- Multi-language support

# Use Cases

1. **Accessibility**
    - Screen readers
    - Voice assistants
    - Audio books
2. **Customer Service**
    - IVR systems
    - Call center analytics
    - Voice bots
3. **Content Creation**
    - Podcasts
    - Video narration
    - E-learning
4. **Transcription**
    - Meeting notes
    - Interviews
    - Media subtitles

# Integration Example

```
# Text-to-Speech
from google.cloud import texttospeech
client = texttospeech.TextToSpeechClient()
voice = texttospeech.VoiceSelectionParams(
    language_code="en-US",
    name="en-US-Neural2-F"
)
audio_config = texttospeech.AudioConfig(
    audio_encoding=texttospeech.AudioEncoding.LINEAR16
)

# Speech-to-Text
from google.cloud import speech
client = speech.SpeechClient()
config = speech.RecognitionConfig(
    encoding=speech.RecognitionConfig.AudioEncoding.LINEAR16,
    sample_rate_hertz=16000,
    language_code="en-US"
)
```

# Best Practices

1. **Text-to-Speech**
   - Use SSML for better control
   - Choose appropriate voice
   - Optimize audio settings
   - Handle rate limits

2. **Speech-to-Text**
   - Use appropriate audio format
   - Set correct sample rate
   - Enable word confidence
   - Handle streaming properly

# Pricing

- **Text-to-Speech**
  - Pay per character
  - Free tier available
  - Different rates for voices
  - Neural voices premium
- **Speech-to-Text**
  - Pay per 15 seconds
  - Free tier available
  - Different rates for features
  - Batch processing discounts

# Future Developments

1. **Text-to-Speech**
    - More natural voices
    - Emotional speech
    - Better prosody
    - Custom voice cloning
2. **Speech-to-Text**
    - Better accuracy
    - More languages
    - Real-time translation
    - Context understanding

# Questions?

Contact:

- Google Cloud Documentation
- API Reference
- Support Channels
- Community Forums