Aim:
To detect exoplanets by analyzing the light curves of stars using the Lightkurve library and Python.

Objective:

1. To download and process pixel data of stars from the Kepler and TESS missions.
2. To generate light curves and flatten them for easier pattern recognition.
3. To use periodograms to identify periodic signals that may indicate the presence of exoplanets.
4. To determine the period, transit time, and duration of potential exoplanets by analyzing the phase-folded light curves.

Summary:
This project involves searching for exoplanets by analyzing the light curves of stars using the Lightkurve library in Python. The process begins by downloading pixel files for specific stars and converting them into light curves. The light curves are then flattened and phase-folded to reveal periodic signals. A periodogram is used to identify the most likely period of any orbiting objects, which could indicate the presence of an exoplanet. The project successfully determines the period, transit time, and duration of the potential exoplanet.

Tools and Libraries Used:

- **Python**
- **Lightkurve**: For analyzing light curves from NASA's Kepler and TESS missions.
- **NumPy**: For numerical computations.
- **Matplotlib**: For plotting the light curves and periodograms.

Procedure:

1. **Install and Import Libraries**: The Lightkurve library and other necessary libraries like NumPy and Matplotlib are installed and imported.
2. **Download Pixel Data**: The pixel file for a specific star is downloaded using the search_targetpixelfile function.
3. **Generate Light Curve**: The pixel data is converted into a light curve using an aperture mask to isolate the star.
4. **Flatten Light Curve**: The light curve is flattened to remove trends and make periodic signals more apparent.
5. **Phase-Fold Light Curve**: The flattened light curve is phase-folded using a specific period to stack the signals.
6. **Periodogram Analysis**: A periodogram is generated to identify the most likely period for any orbiting object around the star.

7. **Exoplanet Detection**: The period, transit time, and duration of the potential exoplanet are calculated and analyzed.

Highlights:

- **Lightkurve Library**: Utilized for downloading, processing, and analyzing light curves.
- **Periodogram Method**: Box Least Squares (BLS) method used to detect periodic signals in the light curve data.
- **Phase-Folding**: Critical technique for identifying the periodicity of potential exoplanet transits.

Conclusion:
The project demonstrates a successful application of the Lightkurve library to detect exoplanets by analyzing light curves. By using periodograms and phase-folding techniques, the project identifies potential exoplanetary candidates and calculates their orbital parameters, showcasing the effectiveness of these methods in exoplanet detection.