Present thesis is focused on the synthesis and characterization of $Lu_2Ir_2O_7$ single crystals as a part of a broader study of rare-earth $A_2Ir_2O_7$ pyrochlore iridates, where A = Y, La-Lu. These materials, crystallizing in the geometrically frustrated pyrochlore lattice and with electronic properties being shaped by strong spin-orbit interaction, have attracted considerable attention of the condensed matter community. The investigation of $Lu_2Ir_2O_7$ with nonmagnetic Lu^{3+} cations is crucial in order to reveal the physical properties connected to magnetism of solely the Ir sublattice. The physical properties connected to the Ir sublattice are essential for a proper interpretation of the complex properties of other $A_2Ir_2O_7$ with magnetic rare-earth cations. For the first time, large good-quality $Lu_2Ir_2O_7$ single crystals were synthesized by means of the flux method. Their stoichiometry and crystal structure were characterized by means of Laue diffraction and energy-dispersive X-ray technique. Magnetic properties were investigated employing magnetization measurements under ZFC and FC regimes. A bifurcation between ZFC and FC magnetizations was revealed at $T_{\mathrm{Ir}} = 130(1)$ K, indicating magnetic ordering of the Ir sublattice. Investigating single crystals, the anisotropy effects were studied for the first time. Significantly lower magnetization was observed for magnetic field applied along the [111] crystallographic direction compared to the directions [100] and [110]. The measured data were interpreted considering antiferromagnetic all-in-all-out ordering of Ir magnetic moments and hypothesized formation of field-oriented domains and ferromagnetic domain walls below T_{Ir}. The results were discussed in the framework of previous studies on $A_2Ir_2O_7$ pyrochlores and $Lu_2Ir_2O_7$ polycrystal.